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Species assemblages of solitary bees and wasps
Hybrid willows The bees of Lincolnshire Part 4
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SPECIES ASSEMBLAGES OF SOLITARY WASPS AND BEES

Michael Archer

Introduction

When a natural historian, such as myself, visits a site, which can vary in size from the New Forest to a suburban garden, records are made of all the species of wasps and bees that are found. After several visits to a site a series of species lists or a species assemblage of that site is obtained. This address is about such species assemblages, but restricted to the species of solitary wasps and bees. In the UK there are just over 450 species of solitary wasps and bees. The social wasps and bumble bees will not be considered.

Before dealing with the analysis of species assemblages I would like to introduce you to four species of solitary wasps and bees and look at how previous workers dealt with species assemblages.

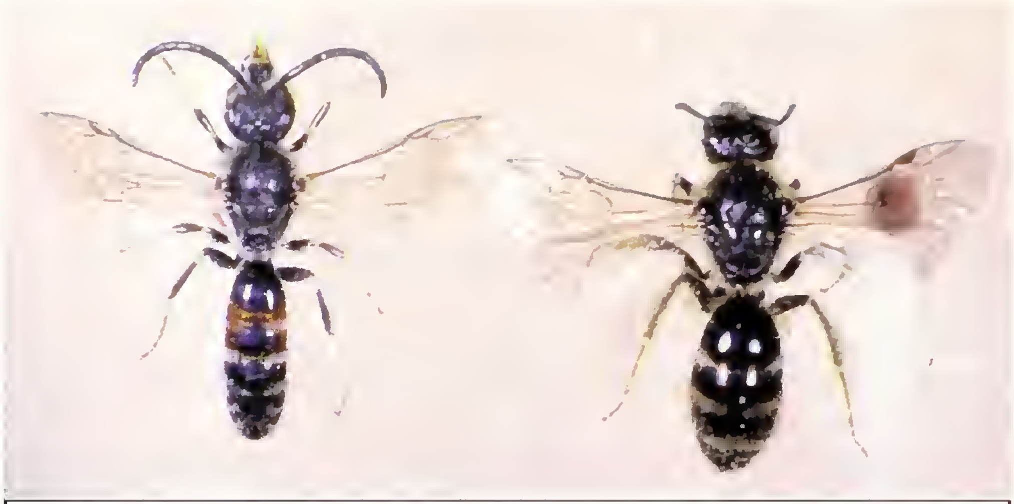
The life histories of four species

The first species is an early spring mining bee *Andrena clarkella* which typically nests in dry, friable, sandy soils in open, sunny sites, sometimes protected from the wind by trees. Males and females overwinter with mating occurring in the spring. The female then digs a vertical burrow with several cells immediately arising from it (Page 59). On my study site several hundred burrows were present as an aggregation. Each cell is stocked with a spherical ball of pollen and nectar, on which an egg is laid (Page 59). On hatching the larva quickly matures and then enters into diapause until it emerges as an adult the following spring. The female of the cuckoo bee *Nomada leucophthalma* may enter the burrow and lay an egg in a cell. On hatching, the larva of the cuckoo bee kills the egg or young larva of its host before eating the pollen ball.

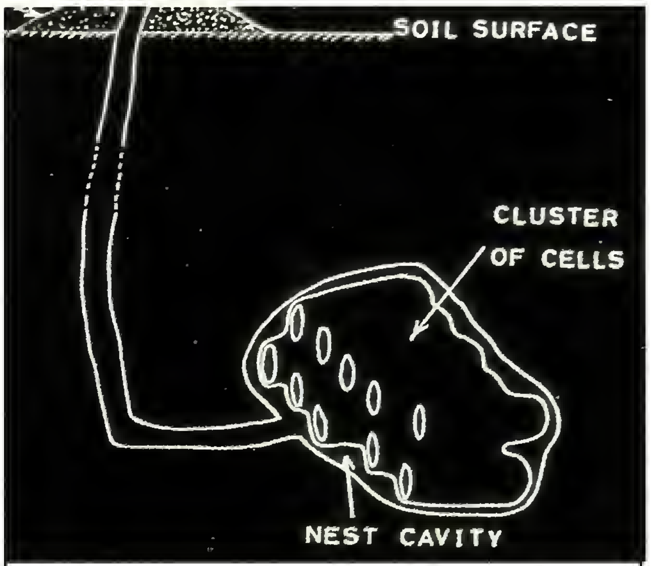
Andrena clarkella Roger Key

Andrena clarkella burrow entrances
Michael Archer

The second bee species, sometimes called a sweat bee *Lasioglossum calceatum*, also digs an underground burrow in a wide variety of dry friable soils. The males and females mate in late summer with only the fertilised females overwintering. In the spring the female digs a burrow and builds several earthen cells which are arranged in a regular cluster. During the summer normally a first generation of only females emerge and help the foundress to build further cells and raise a second generation of males and females. Such a life-history shows the beginnings of eusociality. This bee is really a social bee but conventionally it is treated with the solitary bees. The female cuckoo bee *Sphecodes monilicornis* may enter a cell, destroy the host's egg and lay its own egg on the pollen ball.



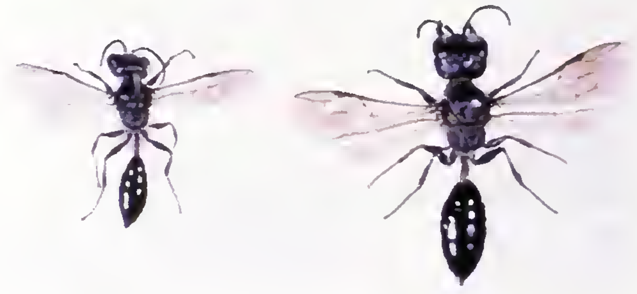
Lasioglossum calceatum male & female (Page 1) M. Archer



Lasioglossum calceatum burrow with cluster of cells (Page 1)

The third species is a solitary mason wasp *Odynerus spinipes* which often nests in dry friable clay cliffs in a sunny situation. A burrow is dug with several cells. An egg is laid in each cell suspended on a silken thread and then each cell is filled with weevil grubs as a food source. These have been paralysed by stinging. Like most species of solitary wasps the adults are active during the summer and overwinter in their cells. Male and females emerge together and mate before nesting takes place. A cuckoo ruby-tailed wasp (*Chrysis viridula*) is able to enter the cells to lay its eggs.

The fourth species is a solitary wasp, often called the mournful wasp *Pemphredon lugubris*. This species is an aerial nester in old beetle burrows found in dead wood present in sunny situations. Many species of solitary wasps and a few solitary bees are aerial nesters. Such aerial nests, besides using tunnels in dead wood, are also found in hollow plant stems such as bramble or elder, cracks in stonework or even empty snail shells. Both the male and the female of the mournful wasp overwinter and emerge during the summer. After mating the female finds a suitable tunnel which is cleaned out and a linear group of cells built. A cell is packed with aphids and



Pemphredon lugubris male and female Michael Archer then an egg is laid. No cuckoo species is known for this species

Previous work on species assemblages

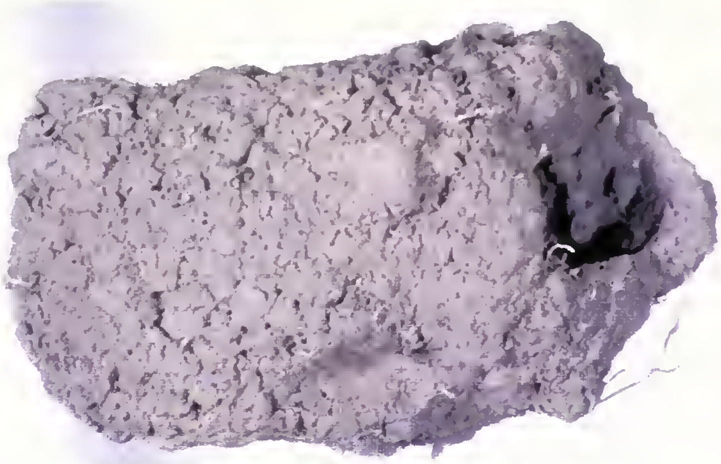
From the nineteenth century, natural historians have been compiling species site assemblages of solitary wasps and bees. Usually when visiting a site only the presence of species is recorded. However, if trapping methods are used, e.g. pitfall, water, suction or malaise traps, the relative abundance of each species can also be estimated. A popular format in which site assemblages are written up may be called the 'classical format'. Such reports consist of two parts with an introduction to the site and an account of the species found. The introduction will often give details of the location of the site, its surface geology and soil types, vegetation and land-use. The resource needs of the solitary wasps and bees, e.g. nesting sites, flower and prey species, may be especially considered. The species account deals with each species in turn often giving much information about actual nesting sites, months when adults are active, flowers visited, prey taken and the hosts of cuckoo species.

During the 1920s when the study of ecology was becoming popular, Richards studied Oxshott Common in Surrey using an 'ecological format'. The site was divided up into its habitats and the species found in each habitat listed with the resources they were using. For example, in the heathland habitat the heather plant is used as a nesting site for the potter wasp. The heather flowers are a pollen source and the invertebrate vegetarians, e.g. caterpillars, feeding on the heather may become prey for solitary wasps. More recently, Falk has used the ecological format to predict the likely impact of proposed developments on individual species. For each species of conservation concern, the site is mapped to show the habitat features and the position of resource needs. If the proposed development would eliminate any of these resource needs, then the impact of the development on species of conservation concern can be predicted.

In my early studies of species assemblages I was particularly attracted to the ecological format. For example, at the sand pit site where the burrow aggregation of the early mining bee *Andrena clarkella* was found, two other species, another mining bee *A. barbilabris* and a solitary wasp *Mellinus arvensis* were also found to produce burrow aggregations. These burrow aggregations occupied different parts of the site which did not overlap. The species seemed to be partitioning the available space despite adult activity being at different times of the year. *A. clarkella* appeared first in early spring, *A. barbilabris* later in the spring and *M. arvensis* later during the summer. My studies of this site were stopped when the pit was filled in and a house built on top.

Andrena clarkella larva on pollen ball (Page 1) Michael Archer

I also become interested in the behaviour of the solitary wasps and bees, particularly of their burrow and cell structures as already shown for the early mining bee *Andrena clarkella* and



Andrena scotica earth cell from burrow
Michael Archer

the sweat bee *Lasioglossum calceatum*. With an emphasis on behaviour, a report could be written in an 'ethological format. One remarkable observation I made was the discovery of up to 25 females of the mining bee *Andrena scotica* using the same burrow entrance but with each female building separate cells underground. The presence of 42 cells was found after further, investigation. Such behaviour is called 'communal nesting' and in this case was probably a consequence of the compacted surface of the soil laid out as a lawn. A crack had developed in the lawn and was being used as the communal burrow entrance. Once underground, the soil was well-drained and friable and the females could burrow and make their own cells. One consequence of this communal behaviour was that there was so much coming-and-going at the burrow entrance that cuckoo bees could not enter the complex.

Odynerus spinipes (Page 2)
Roger Key

The analytical format and the big questions

In recent times, particularly with the availability of computers, I became aware of the power of numbers in analysing the records from a site. This numerical approach has lead me gradually to the development of the 'analytical format'. In particular answers to the following three 'Big Questions' would now seem to be possible:

Chrysis viridula at nest entrance of *Odynerus spinipes* (Page 2)
Michael Archer

1. How many species have I failed to find at a site? Despite, say 15 visits to a site, many species would have only been found on only one occasion (unique species). I began to wonder how many species I had failed to find;

2. What is the conservation value of a site? In one sense all species are of conservation value but it must be recognised that some species are more in need of help than other species, the so-called "species of conservation concern". Such species are often called Priority, Red Data Book or nationally scarce species. Up to 50% of the species of solitary wasps and bees can be considered to be in need of conservation, if only to monitor abundance and distribution. Clearly there are too many species for each species to have its own action plan. However, since many of these species of conservation concern are often found on the same site it would be good to be able to recognise these sites. Then with good habitat management on these sites several species could be helped;

3. Can I compare the species assemblage of one site with species assemblages of other sites? Have a reasonable number of species been found on a site to make such comparisons possible? Since species of solitary wasps and bees have a preference for open, sunny, warm sites with the appropriate nesting sites and food resources it is highly likely that the favourability of a site will depend on its geographical distribution, particularly with regards to latitude, altitude and habitat. It is also highly likely that the larger the area of a favourable site the larger the species assemblage will be.

Rules for collecting records

To collect the records to answer the three big questions some discipline must be exercised in the methods.

1. Visits should only be made during warm sunny weather when the adults are active. This is a big limitation and often means that many years may be needed to get a reasonable species assemblage.

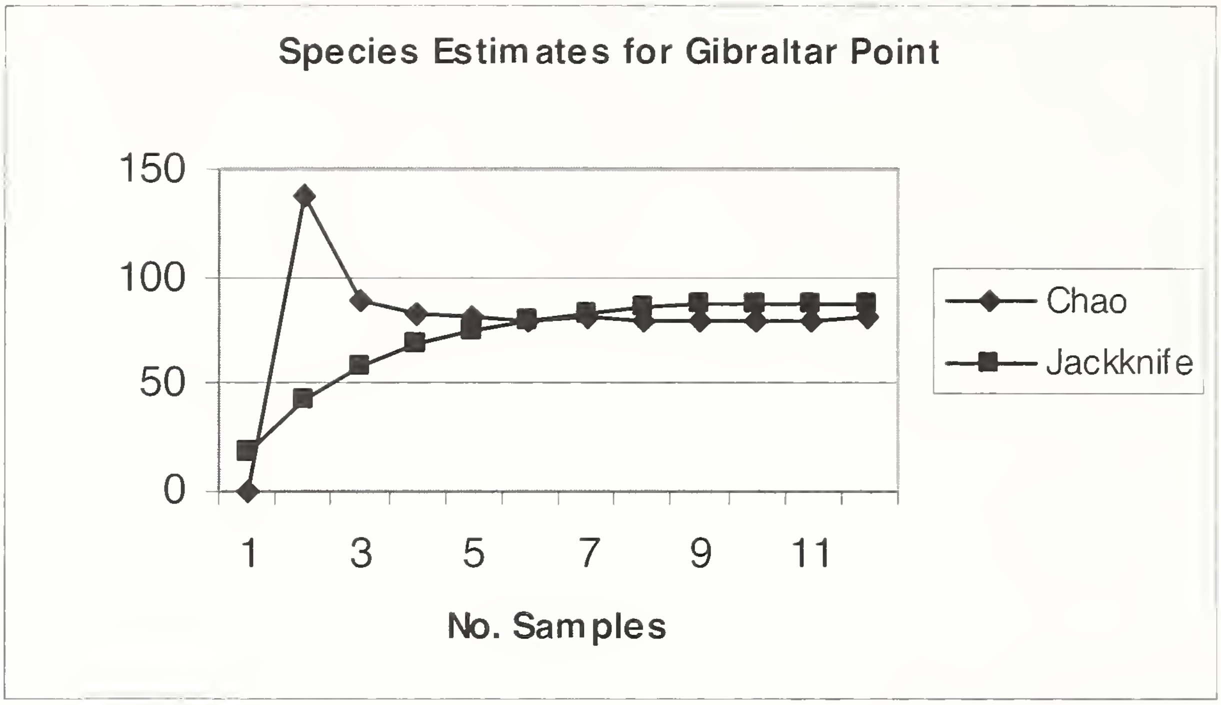
2. During each visit all species should be recorded and the length of each visit must be long enough to achieve this objective. Many species are present at low densities so often much time is spent in searching. Usually visits last about three hours, rarely less, and for one of my sites I need up to six hours to achieve this objective.

3. Visits must be made from April until September, or even October, so as to make sure the spring and summer species are recorded. Usually one or two visits are made during April and September and three visits each during May, June, July and August. After analysis it might be found necessary to make more.

Big Question 1 - How many species have I failed to find?

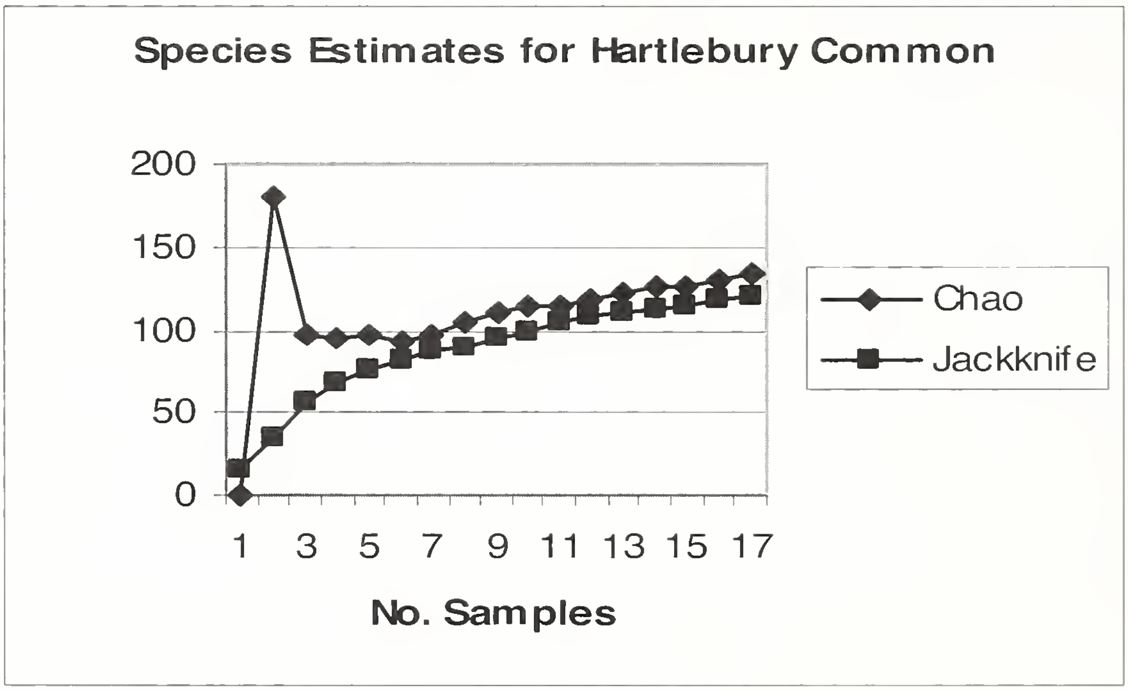
Recently some statistical procedures have been developed that can be used to predict the number of species (species diversity) that might be found on a site given the species lists from several visits. These procedures require the number of species found on either one occasion (unique species) or two occasions (2-occasion species), besides the actual number of species recorded. Many calculations are needed for each procedure which is quickly carried with the appropriate software on a computer. Pisces Conservation Ltd. provides the software.

Figure 1. The Chao and Jackknife species estimates for Gibraltar Point National Nature Reserve



The procedure can be demonstrated by using the species assemblage of Gibraltar Point National Nature Reserve. Gibraltar Point is a sand dune system situated on the Lincolnshire coast. During my twelve visits I found 72 species of solitary wasps and bees. The Chao statistical procedure gives a stable estimate of 81 species (Figure 1.) that could be present with an error of plus-or-minus 11 species and therefore 89% of the estimated number of species has been found. The Jackknife procedure gives a stable estimate of 88 species that could be present with an error of plus-or-minus 10 species and therefore 82% of the estimated species have been found. The stability of these estimates and their close agreement gives confidence in the use of these relatively new statistical procedures. Gibraltar Point is a popular site for natural

Figure 2. Chao and Jacknife species estimates for Hartlebury Common



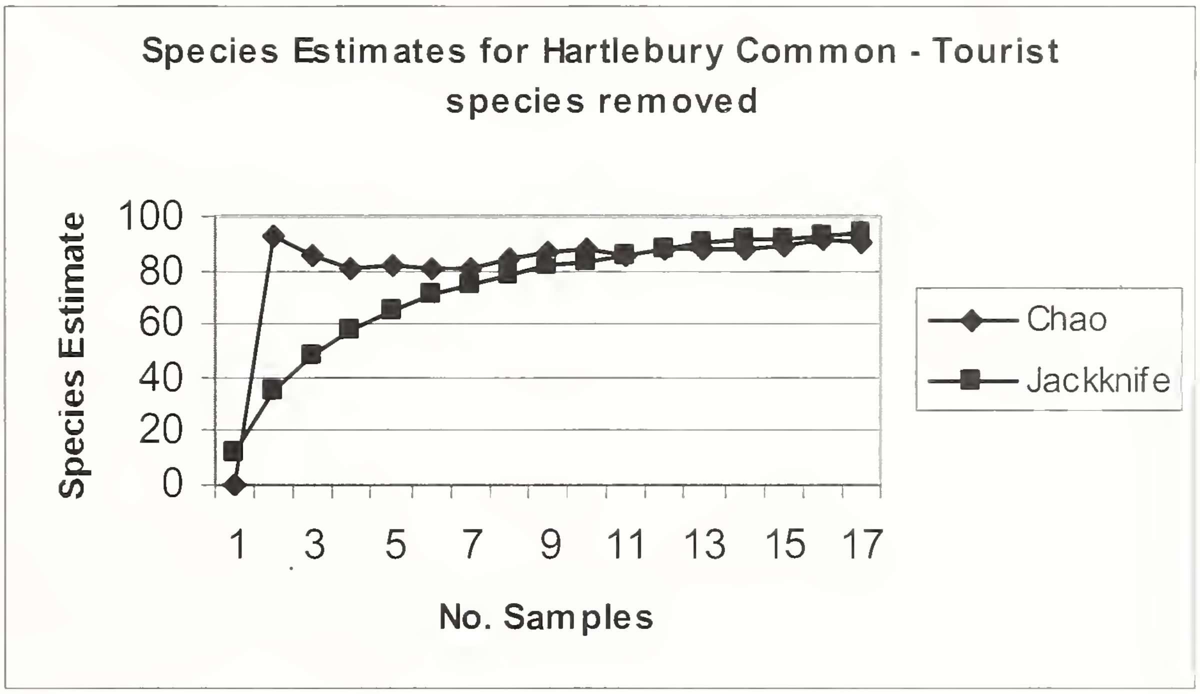
historians and by studying their records I found that, with my records, 84 species had been found, which is between the two estimates of 81 species and 88 species. This additional information gives further confidence in the use of these statistical procedures.

I have found that the species estimates for most of my sites are stable e.g. Risby Warren, Kirkby Moor and Saltfleetby-Theddlethorpe sand dunes. However, in a few cases the species estimates are not stable, but continue to increase as additional visits are made to the site. Hartlebury Common, in Worcestershire, is as an example of such a site. Hartlebury Common is lowland heathland mainly surrounded by urban development. After 17 visits the Chao estimate was 133 species (Figure 2.) with an error of plus-or-minus 34 species, and the Jackknife estimate was 121 species with an error of plus-or-minus 15 species.

Since both estimates were unstable, lacked agreement with each other and have relatively large errors I wondered if there might be something different about this site. Looking at the records there did seem to be an unusually high number of unique species which might be the cause of the unstable estimates.

Unique species may, of course, just be rare species, but they could also be vagrant or tourist species. Vagrant species are species found on a site well outside their normal distribution. Recently I found a potter wasp at York Cemetery which is not a British species but probably came from mainland Europe. There were no vagrant species in the species assemblage from Hartlebury Common. Tourist species are species found on the site by accident. Such species do not nest on the site or regularly visit the site for food resources. The problem was how could tourist species be recognised? From Hartlebury Common four types of species could be considered tourist species. Firstly, species that are generally common and would be expected to be recorded more than once if they were residents on the site. Secondly, the cuckoo species that use as their hosts the first type of species. Thirdly, species which nest in dead wood while dead wood is absent from the site. Fourthly, the bee *Melitta haemorrhoidalis* which was

Figure 3. The Chao and Jackknife species estimates for Hartlebury Common with tourist species removed. (Page 8)



found collecting pollen from the only patch of bellflower growing on a disturbed heap of soil forming the bank for a car park.

With these tourist species removed the Chao estimate was stable with 90 resident species and an error of plus-or-minus 17 species and the Jackknife estimate was stable with 94 resident species and an error of plus-or-minus 10 species (Figure 3., Page 7). The 73 resident species that had been found represented about 80% of the estimated values. With these stable estimates, similar values of the two estimates and the reduced error it can be concluded with some confidence that there are about 92 residents species on Hartlebury Common and an unknown number (in excess of 30) tourist species. Similar problems occurred with the species assemblages of Rauceby Warren and Messingham Sand Quarry.

Big question 2 - What is the conservation value of a site?

To deal with this question it is still necessary to consider all the solitary species found on a site, but also important to give the species of conservation concern a higher status. Those species of conservation concern may be called 'high quality species' and the species not of conservation concern 'low quality species'. A simple working definition of high quality is species found in 70 or fewer 10km squares from 1970 onwards in Scotland, England and Wales, while low quality species are found in more than 70 10km squares from 1970 onwards.

The low quality species can be divided into three statuses depending on their distribution. These distributions are based on the Institute of Terrestrial Ecology Land Classes which have proved useful in describing the distribution of many other taxonomic groups of land animals and plants. Species found only in the land classes of Southern Lowlands and the South-west and Coasts (about half of England) can be given a 'Restricted Status'. Species with an extended distribution from the Southern Lowlands and South-west Coasts into the Midland Lowlands and Central Eastern Coasts can be given a 'Widespread Status'. Widespread species occupy England (except Northumbria), Wales and South-west Scotland. Finally 'Universal Status' species extend into Northumbria and the rest of Scotland. In these three distributions the moorlands and uplands, although included within the ranges of restricted, widespread and universal species, may not be occupied because of unfavourable conditions.

High quality species can also be divided into three statuses depending on the number of 10km squares occupied. Thus 'Very rare Status' species are found in 15 or fewer 10km squares, 'Rare Status' species in 16-30 10km squares and 'Scarce Status' species in 31-70 10km squares.

The statuses of species are not fixed and can change as a result of new information about the distribution of a species, or the increases and decreases of ranges of species that can occur.

Each species recorded from Gibraltar Point, as an example, can now be given a status value (Table 1). Adding up these status values for all the solitary species gives a Quality Score of 138. Dividing this quality score by the number of species gives a Species Quality Score (SQS) of 1.6. The SQS, like the quality score, has no units and can only be interpreted by comparison with other sites. Good sites in England have SQSs varying from 1.8 in South Yorkshire to about 5.5 in Dorset, i.e. SQSs increase with decreasing latitude in England. The SQS for Gibraltar Point has the SQS expected from its latitudinal position and thus Gibraltar Point can be considered a good English site for conservation purposes. In addition 4 high quality species have been found on Gibraltar Point.

Table 1. The Archer national quality scores of the species of solitary wasps and bees recorded from Gibraltar Point (Species Quality Score (SQS) = 138/84 = 1.6).

Status	Status value(A)	No. species (B)	Quality Score (A x B)
Universal	1	54	54
Widespread	2	26	52
Scarce	8	4	32
Total		84	138

For 21 sites in the north and north midlands of England it has been found that quality scores of, and the number of high quality species found on, sites are positively correlated with the area of the site. Thus the larger the area of a site the higher the quality score of that site and the chance of finding more high quality species increases. However, the positive correlation of these sites between their SQSs and their areas is very much reduced. Thus to some extent the SQSs eliminate the effect of the area variable. This observation makes it possible to compare sites of different areas directly by using their SQSs, although the effect of the latitude variable will still operate. The probable reason why SQSs do not increase with area is that as the area of a site increases, not only does the number of high quality species increase but so does the number of low quality species, i.e. the effect of the increased high quality species on the SQS is cancelled by the increased number of low quality species.

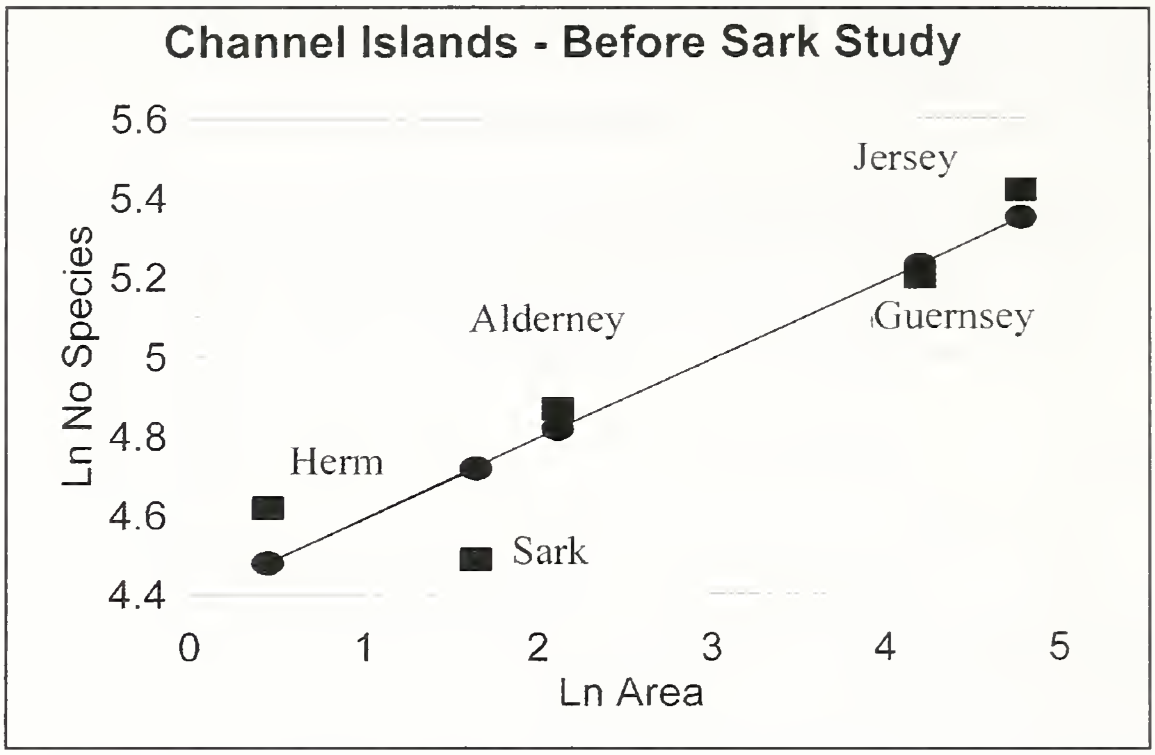
For eastern England the SQSs decrease on the best sandy sites from north to the south of England: 1.3 for Northumbria to 5.5 for Dorset. This observation is probably a consequence of climate variation as the number of solitary aculeate species is more numerous on the warmer southern English sites.

Clearly the number of species, high quality species, quality scores and SQSs of sites can all be used to answer the question about the conservation value of a site.

Big Question 3 - Have sufficient species been recorded from a site so that comparisons can be made with other sites?

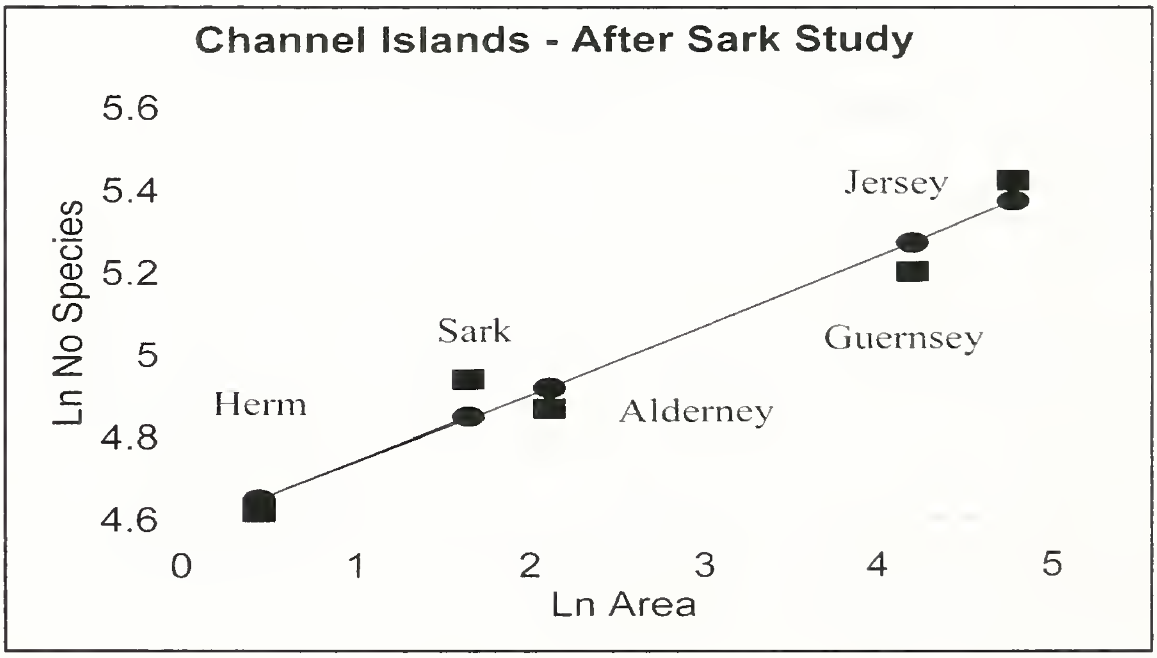
If a species diversity investigation has been carried out to answer Big Question 1, the answer to Big Question 3 will be known. But often a species diversity investigation has not been made and it is not possible to reconstruct the records from each visit to a site. What can be done? One way to resolve this problem is the use of the species-area relationship where the number of species and the area of the sites, both expressed as natural logarithms (ln), can show a positive linear relationship (Usher, 1986). If the number of species in relation to the area of a site falls within the range of other sites which show a statistically significant species-area relationship, then the site may reasonably be compared with the other sites.

Figure 4 . The number of species versus island area in sq. km. for the Channel Islands before the Sark study



The use of species-area relationship can be illustrated from studies of the number of species of solitary wasps and bees found on the Channel Islands of Jersey, Guernsey, Alderney, Sark and Herm (Figure 4). The dots for Jersey, Guernsey, Alderney and Herm are clearly associated with the straight line species-area relationship, but Sark falls below the line. This could indicate that Sark has less favourable habitats for solitary wasps and bees or that with further investigation more species could be found. If more species are present on Sark then it can be calculated that on average about another 35 species would be present. Mr Beavis, from Tunbridge Wells, has been to Sark to try and find these extra species. He was successful and now Sark is closely associated with the species-area line of the other Channel Islands (Figure 5).

Figure 5 . The number of species versus island area in sq. km. for the Channel Islands after the Sark study

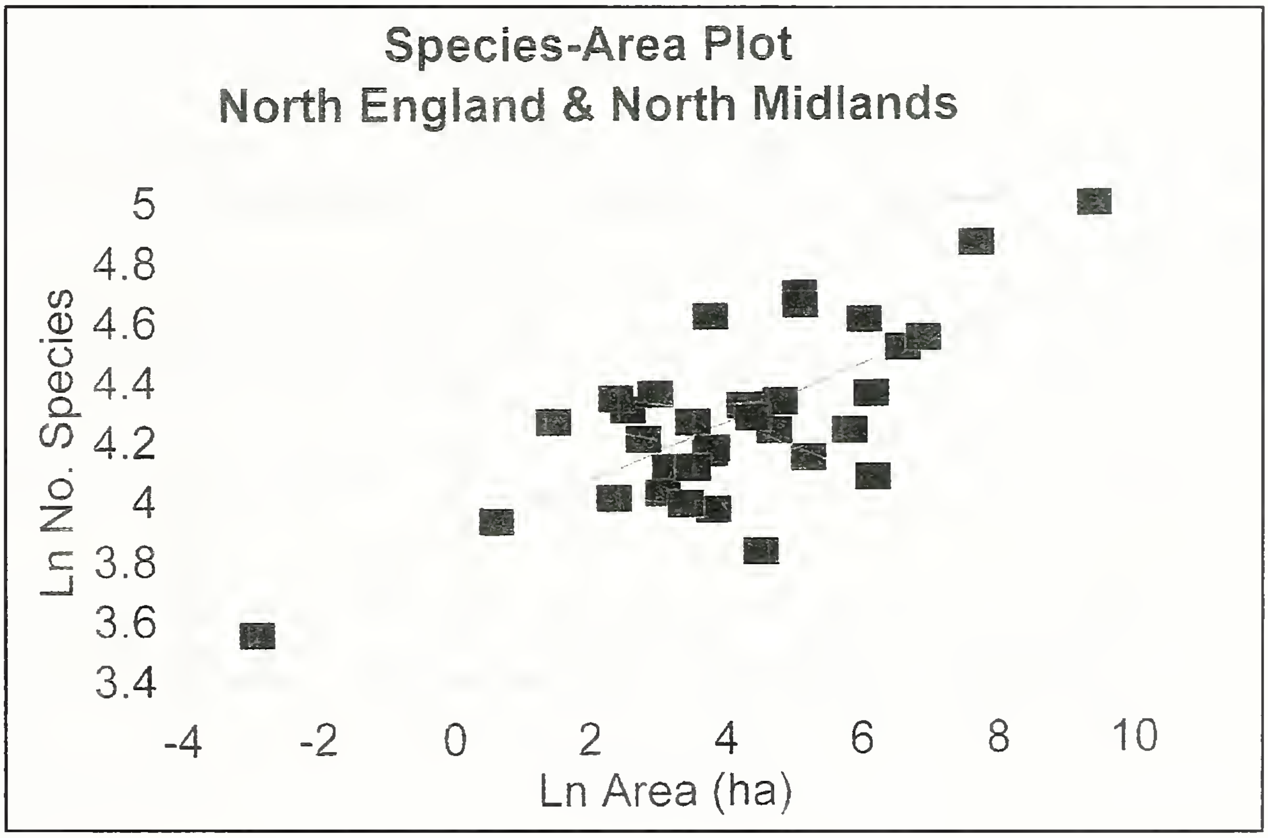


If the species-area dot for a site occurs above the line it most probably implies that the site is more favourable to species of solitary wasps and bees. Another possible reason for the species-area dot to occur above the line is that part of the site may have recently been destroyed by some development, e.g. new housing or intensive agriculture. Despite this development most, if not all of the species, survives although probably with reduced populations. Then later it is highly likely that some species will go extinct on the site so that the number of species becomes adjusted to the reduced area of the site.

In future it will be interesting to study how different altitudes and different habitats affect site relationships to the established species-area lines. Recently I have found four upland sites at altitudes between 90m-260m in Yorkshire where the species-area dots fall below the line. Presumably with increasing altitude sites become less favourable for species of solitary wasps and bees. A study at a higher altitude at Malham Tarn (375m) in the Yorkshire Dales found only three solitary species

The habitat variable seems less important for sites in north and north midlands of England since the species-area dots for habitats from coastal and inland sandy, river bank silty soils, clay soils in open woodland and parkland calcareous sites are all associated with the same regression line (Figure 6). The only sites whose species-area dots fall below the line are wetland sites particularly if largely woodland, e.g. Askham Bog near York. Such sites would lack subterranean nesting sites and the sun would be prevented from warming possible aerial nesting sites.

Figure 6 . A species-area plot for sites from north England and north midlands



Once it is found that a sufficient number of solitary species has been found from several sites using the species-area relationship it becomes possible to carry out comparisons between these sites. The use of the cuckoo or cleptoparasitic load (CL) will be used to illustrate such a comparison. The CL is the percentage of solitary species that are cleptoparasites (or parasitoids) on other host solitary species. Wcislo showed that parasite behaviour among aculeate Hymenoptera correlated with geographical latitude. Thus the parasitic rates are higher in temperate regions as host populations are more synchronised in their life-history characteristics than in tropical regions. This finding probably does not hold for desert regions where the occurrence of rainfall would tend to synchronise life history characteristics. From a review of the literature Wcislo found that the CLs for bees in Europe varied between 16% and 33%, a range of 17%.

Archer found that the CLs for the solitary bees from north and north midlands sites of England vary between 22% and 37%, a range of 15% which is very similar to the range found by Wcislo.

Wcislo gives no CLs for solitary wasps but Archer found that for north and north midlands of England CLs vary from 10% to 22%, a range of only 12%.

The lower CLs values for the solitary wasps are probably a consequence of food-chain relationships. The cuckoos of the solitary bees are secondary consumers while the cuckoos of solitary wasps are tertiary consumers. Since solitary wasps and bees are approximately the same size it might be expected the higher the position in the food-chain a species occupies, the fewer hosts will be available. Since the cuckoos of solitary wasps are higher in the food-chain it may be expected that there will be fewer cuckoo species of solitary wasps than of solitary bees.

Summary

I hope I have shown you that I have gone some way to answering the three Big Questions.
1. How many species were missed? Generally this can now be estimated and where it cannot either more visits can be made or the tourist species removed from the analyses to reveal the resident species.
2. What is the conservation value of a site? The number of species or high quality species, quality or species quality scores can all be used as suitable measures of conservation value. Species quality scores seem to be particularly useful as they are less affected by the area of sites.
3. Have sufficient species been recorded so that comparisons with other sites can be made? When the answer to Big Question 1 is unknown, the species-area relationship offers a solution.

The assemblage of species on a site will be influenced by area, latitude, altitude and habitat, and probably by other factors such as whether the site is situated on an island, a peninsula or the mainland. The conservation and species-area relationship measures offer some hope of investigating these variables.

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THE PRINCIPAL COLLECTIONS OF LINCOLNSHIRE NON-MARINE MOLLUSCS

E.J. Redshaw

In 1985 I attempted to locate the whereabouts of the main collections of Lincolnshire non-marine molluscs, together with the names and biographical details of their collectors.

The following account details the information that I was able to glean, mainly from the pages of the Transactions of the Lincolnshire Naturalists' Union. I am grateful to Dr Michael Kerney, former National Recorder of Non-Marine Molluscs, for the Conchological Society of the British Isles and Ireland and to Adrian Norris former Curator of Molluscs at Leeds \Museum for additional biographical information supplied to me in the 1980s. Where possible I have up-dated these details to take into account changes in location of collections. In some cases collections have been lost and where known this information is provided. The accounts are provided in the alphabetical order of collectors' names.

BALL, Thomas of Brigg. Born 5th March 1833, (in Brigg?). Compiled a 'Pioneer List of Lincolnshire Land & Freshwater Shells' found within a radius of 1.5 miles of Brigg.This was published in "Young England" in 1894,Vol 3. Left Lincolnshire c.1879 and took his collection with him. He died in Auckland, New Zealand, on 30th January 1906. Roebuck believed the collection to be in Auckland Museum.

BEAULAH, John of Ravensthorpe. Alive in 1909 according to Roebuck (LNU, 1909). A collection from the north of the county made from 1860 to 1865 was still in existence in 1907 (E.A.W-P, LNU 1907), but location no longer known in 1909 and possibly lost.

BEETLESTONE, John F. of Louth. Born in London, then moved to Glentham. Schoolmaster in Market Rasen 1908-1922. Resident in Louth 1926-1937. Made an extensive collection from the north of the county. His collection was acquired by E.C. Riggall and was subsequently acquired by E.J. Redshaw on Riggall's death in 1976.

BURTON, F.M. of Gainsborough. Born 1829, died 1912. Geologist. President of LNU 1894-5 and 1895-6. Collected in the Gainsborough area. His collection was in the City and County Museum, Lincoln. For the fate of this collection see under Carter.

CARTER, Charles.S. of Louth. 1865-1933. President of LNU 1928 and 1929. Curator of Louth Antiquarians and Naturalists Society Museum. Author of Non-marine Molluscs in Lincolnshire (LNU, 1905). Had an extensive collection of specimens collected throughout the county. He also acquired specimens from J. Hawkins of Grantham (LNU, 1929). Part of Carter's valuable collection was 'thrown onto the rubbish heap' when he died, but was rescued by Riggall and is now in possession of Redshaw. Part of Carter's collection was held by Lincolnshire County Council at the City and County Museum, Lincoln. This collection was presented to the museum by Mr Carter's widow in 1933 and in 1985 was stored in wooden cabinets in the Old Drill Hall. This collection had been lost/destroyed before the natural history collections were moved to storage in Stamp End in 1993.

CROW, Vincent of Louth. Possibly the son of Benjamin Crow 1893-1927 who was secretary of Louth Mechanics' Institute. A small collection made about 1900-1920 was housed in cigar boxes. This was acquired by Riggall, and subsequently passed to Redshaw on Riggall's death. The collection is now in the museum of Spalding Gentlemen's Society.

FIERKE, Frederick William of Hull. Collected in Lincolnshire c.1895. His collection, including Yorkshire material, in Hull Museum was destroyed during a World War II air raid.

GIBBONS, David. Collected in the Scunthorpe and Louth areas in the late 1960s. His collection in Scunthorpe Museum. (pers comm. the late R.B. Walker)

HAWKINS, John of Grantham. 1820-1917. Born in Newark. Bootmaker in Grantham. Collected Lincolnshire material as early as 1855. His collection given to C.S. Carter shortly before his death in 1917.

MAPLES, Ashley Kilshaw of Spalding, solicitor. Fl 1889-1950. Sometime Honorary Secretary and President of Spalding Gentlemen's Society. Collected on Cowbit and Crowland Washes in 1917 following a request from Roebuck. His collection is now in the museum of Spalding Gentlemen's Society.

MUSHAM, John Frederick. Born York 1865. President of LNU 1920. Ran the conchological activities of LNU, with Roebuck, from 1915 to 1918 then unaided until 1956. Died 1957 in Ulverston, Lancashire. Recorded extensively in the county until 1943. His Lincolnshire collection was housed in City and County Museum, Lincoln. For its fate see under Carter and Woodruffe-Peacock.

OLDHAM, Charles. Life member of LNU from 1934, died 1943. A foremost authority on conchology (and ornithology). (Obituary LNU, 1943). Collected mainly in the north of the county and especially in the Broughton deposits. His collection is in the British Natural History Museum.

WOODRUFFE-PEACOCK, Rev. Edward Adrian. Born Bottesford Manor 23rd July 1858, Vicar of Cadney near Brigg 1891-1920. President of LNU 1905-6 and Joint Founder of the Union with Roebuck in 1893. Collected extensively in the north of the county. His important county collection was in the City and County Museum, Lincoln in 1985, when it was housed in wooden cabinets in the Old Drill Hall. This collection was also lost/destroyed before the natural history collections were moved to Stamp End in 1993.

RANDS, of Caister. Fl.1852. No trace in 1907 of a collection of 60-70 specimens made c. 1849-1851 from the Broughton area. (E.A.W-P in LNU, 1907). He fell in the Crimean War.

REDSHAW, Edward John of Pinchbeck. Started recording molluscs in 1953, from the Welland washes. Section Officer for Conchology from 1973, President LNU 1985. County Recorder for the Conchological Society for Atlas Surveys from 1970. Countywide collection made 1969-2000, is still in possession of the collector. See also collections of Beetlestone, Carter and Riggall.

RIGGALL, Eric Cary of Louth, later of Collingham. Fl. 1900-1976. LNU Section Officer for Coleoptera c. 1945. His extensive collection of Lincolnshire mollusc specimens was acquired by Redshaw from Riggall's widow in 1976.

ROEBUCK, William Denison of Leeds. A collection of his Lincolnshire specimens was in the City and County Museum, Lincoln, stored in the Old Drill Hall in 1985. Also lost/destroyed before the natural history collections moved to Stamp End in 1993. The major part of Roebuck's collection, including Lincolnshire specimens is in Leeds Museum.

SMITH, Arthur. Fl. 1869-1947. Appointed Curator of City and County Museum, Lincoln in 1905. Hon Secretary of LNU 1905-1933. President 1934. His collection, though mainly of Lincolnshire marine species, was in City and County Museum.

WILKIN, Violet of Hibaldstow. Recorded and collected extensively in the north of the county from 1973, including sub-fossil material from the Broughton deposits. Her reference collection is now in the possession of Colin Smith (LNU entomologist). The Broughton material is held with the LNU Collections at Riseholme College.

Although other conchologists have collected in the county, in many cases they have collected for one of the persons listed above. Consequently this article relates only to those collections known to me. A full list of conchologists who have been active in the county over past years would be far longer than the present article.

HYBRID SHRUB WILLOWS IN MID-LINCOLNSHIRE

Tim Smith

In Lincolnshire, the shrub willows goat willow *Salix caprea*, grey willow *Salix cinerea* and osier *Salix viminalis*, are common and widespread species (Gibbons, 1975; Preston, Pearman & Dines, 2002), being found along watercourses, adjacent to standing waters and in wetlands. Hybrids between these species are however much less common and this article reports the discovery of *Salix caprea x S. viminalis (S. x sericans)* and *S. cinerea x S. viminalis (S. x smithiana)* at old gravel pits in mid-Lincolnshire in 2006 and 2007.

There is a note in the county Flora which states that 'hybrids between many ... willows occur', an observation which presumably includes hybrids between *S. caprea, S. cinerea* and *S. viminalis*, but no details are given.

The New Atlas shows very few Lincolnshire records for any hybrid willow but for *S. x sericans* there are possibly three records for the period 1987-99, one from 1970-86, and three pre-1970, all for native plants scattered in the west and south of the county. The Lincolnshire plant database has three post-2000 records for Messingham (in SE80 and 90), one in TF36 from 1983 and one from Gibraltar Point (TF55) from 1967. Clearly this hybrid has not been widely recorded.

For *S. x smithiana* the New Atlas shows one pre-1970 record, one record from 1970-86, and five from 1987-99, all for native plants and scattered in the west and south of the county. The Lincolnshire plant database has 16 records spanning the period 1937-2006, mostly from the Fens, but also from the west of the county, the coast and Middle Marsh. This hybrid has been more widely recorded than the previous one.

The current records were made in the course of botanical and habitat surveys which were undertaken, whilst working for Lapwings Consultants Ltd, at Tattershall Leisure Park in 2006 and at Kirkby-on-Bain and Tattershall Thorpe in September 2007. In each case the hybrids were found in the belts of mixed scrub which flank the old flooded gravel pits. The Tattershall Leisure Park site had both hybrids, whilst only *S. x sericans* was found at Kirkby-on-Bain and Tattershall Thorpe. The Tattershall Leisure Park site also had white willow, goat willow, grey willow, crack willow and osier; the Kirkby-on-Bain site also had white willow, crack willow, osier, goat willow, grey willow, weeping willow, almond willow; the Tattershall Thorpe site also had white willow, goat willow, grey willow and osier. The approximate grid references of the willows are TF 195 596, 208 570 and 237 612.

The hybrids are spontaneous and appear to be of the same age as the other shrub willows at each site, thus they would have colonised the old gravel pit margins at virtually the same time as their parents. These hybrids and other willow hybrids, should be looked for elsewhere in suitable habitats.

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THE BEES (HYMENOPTERA: ACULEATA) OF WATSONIAN LINCOLNSHIRE. 4. Mining Bees, ANDRENINAE.

Michael Archer

This is the fourth paper on the bees of Lincolnshire and deals with the bees of the subfamily Andreninae. An introduction to these bees can be gleaned from Nixon (1954), Andrewes (1968), O'Toole & Raw (1991), Weiss (2002) and Michener (2007). Else (in preparation), when published, will be the standard book on the British bees dealing with the natural history of each species in detail besides giving illustrated keys to all the species. The current major sources of species information are the Provisional Atlases of the Bees, Wasps and Ants Recording Society (BWARS). These provide a national distribution map and detailed natural history information for each species. These Atlases are far from complete, but the relevant one will be indicated as each species is considered.

This paper considers 412 records of 32 species where a record represents a specimen differing in one of the following three variables: name, sex and day-date of capture or observation. These records were made by 28 recorders from 53 sites. The recorders were: M.E. Archer (MEA), H. Britten (HB), B. Bushby (BB), J.W. Carr (JWC), Cassal, R.T. (RTC), R. Davidson (RD), W.A. Ely (WAE), A. Faulkner (AF), J. Flanagan (JF), C.F. George (CFG), A. Godfrey (AG), M.W. Graham (MWG), S.J. Hayhow (SJH), D.S. Hill (DSH), W.G. Hoff (WGH), H.P. Jones (HPJ), R.S. Key (RSK), A.S. Lazenby (ASL), E.A.W. Peacock (EAWP), A.L. Phillips (ALP), P. Porter (PP), Preston (P), S.P.M. Roberts (SPMR), J. Roussean (JR), C. Smith (CS), S.R. Sowden (SRS), A. Thornley (AT), R.W.J. Uffen (RWJU). The sites with grid references and Natural Areas (Weaver, 1988) are given in the Appendix. The sites are distributed among the Natural Areas as follows: North Lincolnshire Coversands & Clay Vale (20 sites), Lincolnshire Wolds (10), Lincolnshire Coast & Marshes (8), Urban (4), Humberhead Levels (4),The Fens (3), Lincolnshire & Rutland Limestone (2) and Trent Vale & Rises (2).

For each species the records are given in site alphabetical order. Abbreviations are used for the following sites: Gibraltar Point (GP), Grantham (G), Irby upon Humber

(IUH), Kirkby Moor (KM), Kirton-in-Lindsey (KL), Manton & Twigmoor (MT), Messingham Sand Quarry (MSQ), Old Bolingbroke (OB), Rauceby Warren (RW), Risby Warren (RIW), Saltfleetby-Theddlethorpe Dunes (STD), Tattershall Sand Pits (TSP) and Whisby Nature Park (WNP). The year of some of the records of M.W. Graham are not known so are given as 1941, the year in which these records were published. The records of C.F. George are given as pre-1889 and have been entered as 1888. The Red Data Book (Shirt, 1987) and National Notable or Scarce (Lists Na and Nb) (Falk, 1991) statuses with Archer National Statuses (ANS) (Archer, 2002, 2007) are given, as appropriate, for each species. The Archer National Statuses updates the statuses of Shirt and Falk besides giving a status to each of the common and widespread species. The Very Rare ANS is equivalent to Red Data Book status, the Rare ANS to Na status and the Scarce ANS to Nb status. The ANS Universal and Widespread statuses refers to the common and widespread species. Small size refers to species about 3-6mm in length, medium-size species about 6-10mm in length and large species over 10mm in length.

Of the 32 species on the Lincolnshire list, 17 species have a Universal status, 9 species a Widespread status, five species a Scarce status, one species a Very Rare status (*Andrena alfkenella)*, although confirmation of this species is required before it can be accepted.

Genus **Andrena** Fabricius, 1775
Solitary, small to large subterranean nesting bees with short pointed tongues. Generally the cuticle is black except for some males with yellow markings on the head and some species with red markings on the gaster. The hair may be coloured white, grey, yellow or black. Sometimes with white or cream coloured hair bands on the gaster. Pollen-carrying hairs present on the lateral surfaces of the propodeum, hind coxa, trochanter, femur and tibia. Nests may be isolated from each other or close together as an aggregation. Generally a nest consists of an entrance leading to a main burrow with shorter lateral burrows, each ending in a cell or cluster of cells. Females of *A. scotica* may nest communally, with several females sharing a common entrance. The cells are lined with a wax-like substance. The pollen balls are smooth and more or less spherical. One egg is laid on each pollen ball. Most species have a single generation a year, although a few have two generations a year when seasonal dimorphism may be shown. Spring species over-winter as adults, whereas summer species over-winter as diapausing prepupae. The two sexes emerge more-or-less at the same time, the males a few days earlier than the females. Most species are polylectic, but some are oligolectic for pollen sources. Nationally 68 species (1 species restricted to the Channel Islands) with 31 species in Lincolnshire.

Andrena alfkenella Perkins, 1914. RDB3, ANS Very Rare. 1 record. Stainton Wood, 1942, MWG.
Andrena barbilabris (Kirby, 1802). ANS Universal. 65 records. 13 April-1 August. GP, 1990, 1992, 1993, 1994, MEA, 1990, DSH, 1994, RWJU; G, 1942, 1943, HB; KM, 1990, 1994, 1997, MEA; Laughton Common, 1983, 1988, MEA; MT, 1989, 1990, MEA; MSQ, 1989, 2000, 2001, MEA; Nettleton Heath, 1997, AG; OB, 1941, MWG; Raithby, 1941, MWG; RW, 1994, 1995, 1996, 2002, MEA; RIW, 1984, 1985, 1986, 1989, MEA; ST, 1983, 1984, 1985, 1995, 1996, 1998, MEA; Skegness, 1900, JWC, TSP, 1995, AG; WNP, 1994, PP.
Andrena bicolor Fab. 1775. EDWARDS, R. & BROAD, G.R. eds 2006. ANS Universal. 29 records. 26 March-16 September. Ashby, 1899, RTC; Brumby Common, 1980,

RSK; G, 1952, HB; Hameringham, 1936, HPJ; KM, 1992, 1997, MEA; KL, 1888, CFG; Linwood Warren, 1900, EAWP; MSQ, 1988, 1992, 1993, 1996, 1999, 2000, 2001, MEA; OB, 1941, MWG; RW, 1992, 2001, MEA; RIW, 1984, 1985, MEA, 1987, RSK; WNP, 1994, PP.

Andrena chrysosceles (Kirby, 1802). ANS Widespread. 22 records. 28 April-30 July. Blankney Fen, 1994, 1996, ASL; GP, 1992, 1994, 1996, MEA, 1994, RWJU; Hackthorn Beck, 1996, AG; Hagnaby, 1974, AG; KM, 1994, MEA; KL, 1888, CFG; Linwood Warren, 1900, EAWP; MSQ, 1999, 2000, MEA; OB, 1941, MWG; RW, 1992, 1993, 1995, 2001, MEA; STD, 1900, EAWP.

Andrena cineraria (Linn., 1758). EDWARDS, R. & TELFER, M.G. eds 2002. ANS Widespread. 6 records. 11 April-22 May. IUH, 2007, ALP; RW, 2001, MEA; Sausthorpe, 1941, MWG.

Andrena clarkella (Kirby, 1802). EDWARDS, R. & TELFER, M.G. eds 2001. ANS Universal. 15 records. 22 March-21 May. Bradley/Dixon Wood, 2007,ALP; Brumby Common, 1980, RSK; Crow Brick Pits, 1981, RSK; Glentham, 2001, CS; KL, 1888, CFG; Longholme Wood, 1981, RSK; MSQ, 1989, 1995, 2000, 2001, MEA; Salmonby, 1948, MWG; Snipe Dales NR, 1992, ASL; WNP, 1994, PP.

Andrena coitana (Kirby, 1802). ANS Universal. 2 records. 5 July. G, 1950, HB; OB, 1941, MWG.

Andrena denticulata (Kirby, 1802). EDWARDS, R. & BROAD, G.R. eds 2006. ANS Universal. 13 records. 6 July-22 August. G, 1950, HB; MSQ, 1993, 1994, 1999, 2000, 2001, MEA; OB, 1941, MWG; RIW, 1984, 1985, MEA; Scunthorpe, 1901, P.

Andrena dorsata (Kirby, 1802), ANS Widespread. 2 records. OB, 1941, MWG; Woodhall Spa, 1941, MWG.

Andrena fucata Smith, 1847. EDWARDS, R. & BROAD, G.R. eds 2005. ANS Universal. 7 records. May-13 June. Horncastle, 1900, EAWP; KM, 1990, 1996, MEA; MSQ, 1999, MEA; OB, 1941, MWG; TSP, 1995, 1995; Welton Wood, 1988, WGH.

Andrena fulva (Müller *in* Allioni, 1766). EDWARDS, R. & BROAD, G.R. eds 2005. 21 records. 7 April-21 July. Bradley/Dixon Wood, 2007, ALP; GP, 1990, DSH; Grasby, 1975, 1987, BB; Grebby, 1988, WGH; Grimsby2, 2007, ALP; Grimsby3; 2007, ALP; Healing, 2007, ALP; IUH, 2007, ALP; KM, 1994, MEA; KL, 1888, CFG; OB, 1941, MWG; RW, 1990, MEA; RIW, 1985, MEA; Spalding Cemetery, 1995, AF; WNP, 1994, PP.

Andrena fuscipes (Kirby, 1802). EDWARDS, R. & BROAD, G.R. eds 2006. ANS Universal. 11 records. 3 August-11 September. KM, 1989, 1991, 1994, 1999, MEA; OB, 1941, MWG; RIW, 1984, 1985, 1986, MEA.

Andrena haemorrhoa (Fab., 1781). ANS Universal. 57 records. 10 April-7 July. Blankney Fen, 1990, 2003, ASL; Bradley/Dixon Wood, 2007, ALP; Carr Plantation, 1982, SJH; Cornley Lane, 2006, SRS; GP, 1992, 1994, 1996, MEA, 1994, RWLU; Grebby, 1974, 1992, WGH; Hagnaby, 1994, 1994, IUH, 2007, ALP; KM, 1992, 1997, MEA; KL, 1888, CFG; Leasingham Wood, 1993, RSK; MSQ, 1989, 1994, 1995, 1999, 2000, 2001, MEA; Nettleton Heath, 1997, AG; OB, 1941, MWG; RW, 1990, 1992, 1993, 1994, 1997, 2001, 2002, 2003, MEA; RIW, 1985, MEA, 1989, WAE; STD, 1984, 1985, 1995, 1996, MEA; TSP, 1995, AG; WNP, 1994, PP, 2007, JR.

Andrena helvola (Linn., 1758). ANS Widespread. 1 record 14 May. KM, 1994, MEA.

Andrena lapponica Zetterstedt, 1838. EDWARDS, R. & BROAD, G.R. eds 2005. ANS Universal. 5 records. 22 April-14 May. MT, 1989, 1990, MEA; MSQ, 1994, MEA; OB, 1940, MWG.

Andrena marginata Fab., 1776. Na. ANS Scarce. 2 records. 24-26 August. Hameringham, 1936, HPJ.

Andrena minutula (Kirby, 1802). ANS Universal. 6 records. 14 July-27 August. Hameringham, 1936, HPJ; KL, 1888, CFG; OB. 1941, MWG; RW, 2002, MEA; WNP, 2007, PP.

Andrena nitida (Müller, 1776). EDWARDS, R. & BROAD, G.R. eds 2006. Widespread. 2 records. 4 June. KL, 1888, CFG; Linwood Warren, 1900, EAWP.

Andrena nigriceps (Kirby, 1802). Nb. ANS Scarce. 3 records. 22 July-17 August. OB, 1941, MWG; RIW, 1984, MEA.

Andrena nigroaenea (Kirby, 1802). ANS Universal, 35 records. 5 April-6 August. Blankney Village, 1992, ASL; Bracebridge, 2006, PP; GP, 1992, 1994, MEA, 1994, RWJU; G, 1943, HB; Grasby, 1975, 1987, BB; Grebby, 1992, WGH; Hatcliffe, 1982, SJH; KM, 1992, 1997, MEA; KL, CFG; MSQ, 1989, 2000, MEA; OB, 1941, MWG; RW, 1992, 1994, 1995, 1996, 1997, MEA; RIW, 1985, 1989, MEA; STD, 1985, 1995, 1996, MEA; Skegness, 1900, JWC; TSP, 1995, AG; WNP, 2006, PP.

Andrena ovatula (Kirby, 1802). ANS Widespread. 1 record. OB, 1941, MWG.

Andrena pilipes Fab., 1781. Nb. ANS Scarce. 1 record. 20 June. G, 1942, HB.

Andrena praecox (Scopoli, 1763). EDWARDS, R. & TELFER, M.G. eds 2002. ANS Widespread. 11 records. 5 April-21 May. Grebby, 1974, WGH; KL, 1888, CFG; MSQ, 1995, 2001, MEA; OB, 1941, MWG; WNP, 1994, 2006, PP.

Andrena scotica Perkins, 1916. ANS Universal. 63 records. 15 April-25 June. Blankney Fen, 1993, ASL; GP, 1990, DSH, 1990, 1992, 1994, 1996, MEA; Grebby, 1990, WGH, 1992, MEA; Grimsby2, 2007, ALP; Grimsby4, 2007, ALP; IUH, 2007, ALP; KM, 1992, 1994, 1996, MEA; KL, 1888, CFG; MT, 1989, MEA; MSQ, 1989, 1994, 1999, 2000, 2001, MEA; OB, 1941, MWG; RW, 1990, 1992, 1993, 1994, 1996, 2001, 2002, MEA; RIW, 1984, 1985, 1986, 1989, MEA, 1989, WAE; STD, 1983, 1984, 1985, 1996, MEA; Welton-le-Wold, 2000, MEA; WNP, 1994, PP.

Andrena semilaevis Pérez, 1903. ANS Universal. 6 records.
25 May-21 July. Cornley Lane, 2006, SRS; GP, 1994, RWJU; G, 1952, HB; OB, 1941, MWG; Skegness, 1900, JWC; WNP, 1907, RD.

Andrena subopaca Nylander, 1848. ANS Universal. 14 records. 17 April-9 August. Elsea Wood, 1980, RSK; GP, 1990, 1992, 1994, MEA, 1994, RWJU; G, 1942, HB; KM, 1993, 1995, MEA; MSQ, 2001, MEA; Rand Wood, 1941, MWG; RW, 2003, MEA; TSP, 1994, 1995, AG; WNP, 1994, PP.

Andrena synadelpha Perkins 1914. ANS Widespread. 1 record. 1 May. GP, 1994, MEA.

Andrena tarsata Nylander, 1848. EDWARDS, R. & BROAD, G.R. eds 2005. ANS Universal. 1 record. Woodhall Spa, 1941, MWG.

Andrena tibialis (Kirby, 1802). Na. ANS Scarce.3 records. 13 April-11 June. MSQ, 1995, MEA; OB. 1941, MWG; TSP, 1994, AG.

Andrena varians (Kirby, 1802). Nb. ANS Scarce. 1 record. OB, 1941, MWG.

Andrena wilkella (Kirby, 1802). ANS Universal. 3 records. 17 June-13 July. Great Cotes, 1898, AT; MSQ, 1992, MEA; RW, 2001, MEA.

Genus **Panurgus** Panzer, 1806

Solitary medium-size to large, subterranean nesting, short-tongued bees. Cuticle coloured black. Pollen-carrying hairs on hind tibia. Females nest in loose aggregations in bare or sparsely vegetated soils. Entrance of nest leads to a main burrow with lateral burrows, each ending in a terminal cell. The cells are lined with a wax-like material. The pollen balls are smooth and more-or-less spherical. Over-winter as diapausing prepupae. Mainly oligolectic on yellow-flowered Asteraceae for pollen sources. Nationally 2 species with 1 species in Lincolnshire.

Panurgus banksianus (Kirby, 1802). ANS Widespread. 2 records. 13 August-8 September. Woodhall Spa, 1948, MWG.

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Appendix – The grid references and natural areas of sites. The actual location of some sites by some recorders (1, 13, 15, 22, 24, 27, 30, 36, 37, 41, 43, 44, 45, 48, 53) are unknown, so the grid references for these sites can only be approximate.

1. Ashby. SE8908. North Lincs. Coversands & Clay Vale.
2. Blankney Fen. TF1262. The Fens.
3. Blankney Village. TF0860. The Fens.
4. Bracebridge, Lincoln. SK9668. Urban.
5. Bradley/Dixon Wood. TA2405. Lincs. Coast & Marshes.
6. Brumby Common. SE8709. North Lincs. Coversands & Clay Vale.
7. Carr Plantation, Grimsby. TA2806. Lincs. Coast & Marshes.
8. Cornley Lane, Westwoodside. SK7496. Humberhead Levels.
9. Crowle Brick Pits. SE7711. Humberheads Levels.
10. Elsea, Bourne. TF0998. North Lincs. Coversands & Clay Vale.
11. Gibraltar Point. TF5557. Lincs. Coast & Marshes.
12. Glentham. TF0190. North Lincs. Coversands & Clay Vale.
13. Grantham. SK9136. Trent Valley & Rises.
14. Grasby. TA0804. Lincs. Wold.
15. Great Cotes. TA2310. Lincs. Coast & Marshes.
16. Grebby. TF4368. Lincs. Wolds.
17. Grimsby2 TA2309. Urban.
18. Grimsby3. TF0320.Urban.
19. Grimbsby4. TA2510. Urban.
20. Hackthorn Beck. SK9982. North Lincs. Coversands & Clay Vale.
21. Hagnaby TF3462. North Lincs. Coversands & Clay Vale.
22. Hameringham. TF3167. Lincs. Wolds.
23. Hatcliffe, Grimsby. TA2100. Lincs. Wold.
24. Horncastle. TF2669. Lincs. Wolds.
25. Irby upon Humber. TA1905. Lincs. Coast & Marshes.
26. Kirkby Moor. TF2262. North Lincs. Coversands & Clay Vale.
27. Kirton-in-Lindsey. SK9398. North Lincs. Coversands & Clay Vale.
28. Laughton Common. SK8599. North Lincs. Coversands & Clay Vale
29. Leasingham Wood. TF0949. Lincs. & Rutland Limestone.
30. Linwood Warren. TF1387. North Lincs. Coversands & Clay Vale.

31. Luddington Moors. SE8114. Humberhead Levels.
32. Manton & Twigmoor. SE9305. North Lincs. Coversands & Clay Vale.
33. Messingham Sand Quarry. SE9103. North Lincs. Coversands & Clay Vale.
34. Nettleton. TF0999. North Lincs. Coversands & Clay Vale.
35. Nettleton Heath. TF0999. North Lincs. Coversands & Clay Vale.
36. Old Bolingbroke. TF3564. North Lincs. Coversands & Clay Vale.
37. Raithby. TF3767. Lincs. Wolds.
38. Rand Wood. TF0878. North Lincs. Coversands & Clay Vale.
39. Rauceby Warren. TF0343. Lincs. & Rutland Limestone.
40. Risby Warren. SE9313. North Lincs. Coversands & Clay Vale.
41. Salmonby. TF3273. Lincs. Wolds.
42. Saltfleetby-Theddlethorpe Dunes. TF4791. Lincs. Coast & Marshes.
43. Sausthorpe. TF3869. Lincs. Wolds.
44. Scunthorpe. SE8910. North Lincs. Coversands & Clay Vale.
45. Skegness. TF5663. Lincs. Coast & Marshes.
46. Snipe Dales NR. TF3368. Lincs. Wolds.
47. Spalding Cemetery. TF2424. The Fens.
48. Stainton Wood.TF0778. North Lincs. Coversands & Clay Vale.
49. Tattershall Sand Pits. TF1959. North Lincs. Coversands & Clay Vale.
50. Welton Wood. TF4670. Lincs. Coast & Marshes.
51. Welton-le-Wold. TF2787. Lincs. Wolds.
52. Whisby Nature Park. SK9167. Trent Valley & Rises.
53. Woodhall Spa. TF1963. North Lincs. Coversands & Clay Vale.

DECLINING BUTTERFLY SPECIES AT WHISBY NATURE PARK

Phil Porter

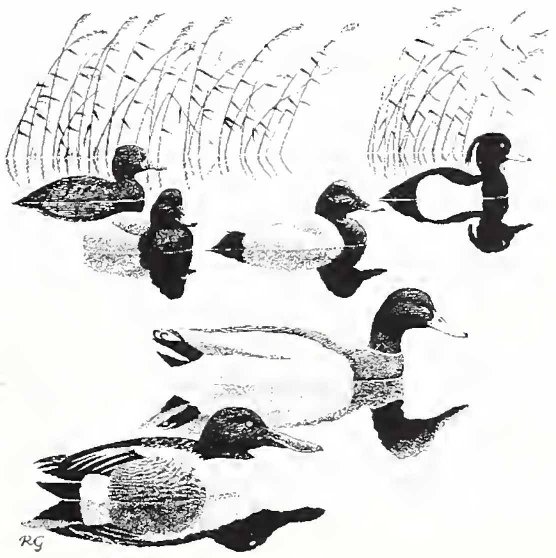
Small heath *Coenonympha pamphilus* and wall *Lasiommata megera* are two species which have been regularly recorded at Whisby Nature Park for many years, but both have declined and registered nil records in one recent year in the face of increasing numbers of wildlife records received in general. The small heath is a small inconspicuous butterfly which needs sunny conditions in which to fly. Favouring rough grassy areas away from managed paths, it is definitely less likely to be seen by visitors. The wall, being larger, distinctively patterned and attracted to worn paths in order to bask in the sun, should logically be recorded to a higher proportion of its actual population.

Figures for the last 9 years, extracted from the Whisby records are as seen in the table below. In terms of statistical comparison, these data are flimsy as there are no transects or even systematic searches undertaken. But for all that, they appear to document the decline of these species. They also illustrate the extent to which familiar organisms get under-recorded even at popular sites.

The small heath emerged fairly consistently around the third week in May up until 2007 when the first generation was almost absent and the total numbers had already fallen to a very low level. At the other end of the scale only 2000 and 2001 failed to provide evidence of the second flight period making the numbers recorded quite low during this time. Taken at face value, the data appear to indicate a fairly rapid decline at the end of the period, coinciding with the wet springs or summer of 2006. The haphazard nature of the observations may allow that a fine summer or two will result in a full recovery in time.

	Date first seen	Date last seen	No. of records	Maximum daily count
Small Heath				
1999	22nd May	22nd August	4	‘present’
2000	16th May	9th July	7	4
2001	25th May	7th June	2	2
2002	21st May	3rd September	6	11
2003	31st May	12th August	5	2
2004	16th May	16th August	10	7
2005	12th May	3rd September	13	13
2006	27th May	29th August	6	1
2007	10th July	7th August	2	‘present’
Wall				
1999	3rd May	18th September	6	10
2000	8th May	3rd August	5	6
2001	20th May	26th August	6	12
2002	11th May	2nd October	5	4
2003	4th May	3rd August	9	40
2004	15th May	4th August	5	3
2005	11th May	20th August	6	1
2006	27th May	26th August	2	1
2007	No records			

The wall emerged somewhat more erratically over the period and more or less missed the first generation at the end of the period after a blank year in 2007. In three out of five years from 2000-2004, the second generation was cut short, although in one of those years, 2003, the maximum count was as many as 40 butterflies and there were 9 records, unequalled in the other years. Setting this year aside, the decline of the wall was more gradual than that of the small heath. The wet periods would also account for the recent reduction. Previously the Whisby population had appeared to be bucking the trend for some national declines in Britain.



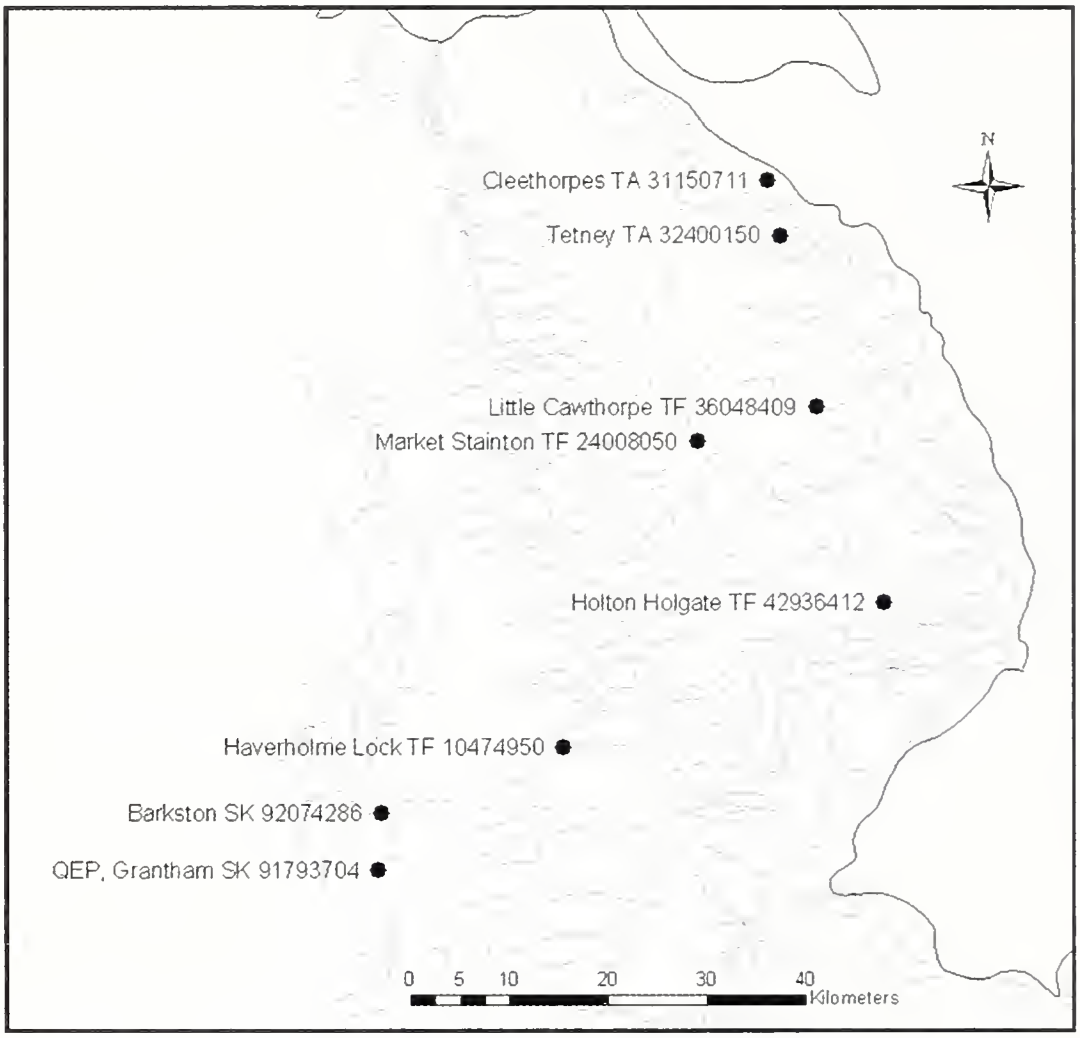
DRAWING SOME CONCLUSIONS FROM THE ENVIRONMENT AGENCY'S WATER VOLE MONITORING IN LINCOLNSHIRE

Nick Kite, Environment Agency

Introduction

The water vole *Arvicola terrestris* has acquired iconic status as a conservation species. This has probably resulted in far more attention and resources being directed towards its long term preservation than many other equally deserving, but less appealing species. Its status as a Biodiversity Action Plan (BAP) species and a recent increase in the protection offered by the law give further impetus to the water vole conservation movement.

Figure 1. Environment Agency water vole monitoring locations in Lincolnshire


N
Cleethorpes TA 31150711
Tetney TA 32400150
Little Cawthorpe TF 36048409
Market Stainton TF 24008050
Holton Holgate TF 42936412
Haverholme Lock TF 10474950
Barkston SK 92074286
QEP, Grantham SK 91793704
0
5
10
20
30
40
Kilometers

In Lincolnshire, the vast network of steep sided drains, kept free of trees and shrubs, combined with only a small (but increasing) population of mink, provides ideal water vole habitat on a large scale. A general assumption held by some, including the Environment Agency, which is the lead BAP partner for this species, has been that they are doing relatively well in the county. Compared to populations elsewhere in the country that seem to be in terminal decline, it seems a reasonable point of view. Furthermore, a high number of the river works carried out in the county for the purpose of flood risk management require mitigation for water voles. It appears that there is more water vole mitigation work here now than ever before, adding weight to the argument.

But how accurate is this assumption? For the past eight years, the Environment Agency has been monitoring eight locations distributed across Lincolnshire for water vole field signs. The specific locations (Figure 1) were chosen as sites where water voles had been known to be present historically.

The monitoring was established to provide a rough means of determining the general trend in water vole populations in Lincolnshire. Each site has a core 100m stretch of river. This core section is surveyed twice a year, in the spring and autumn. Most work is done by Environment Agency staff, with the exception of an extended survey that is done biennially, in the autumn. The biennial survey includes 500m on either side of the core stretch. This whole survey, including the core 100m, is undertaken by consultants. It provides a total of 1100m of information to put the core data in to context at each location.

The core monitoring is simple. Using the standard recording form taken from the Water Vole Handbook (Strachan, 1998), two surveyors spend approximately 40 minutes looking for water vole field signs and recording the findings on a sketch map. Surveys are never carried out immediately after high flows or cold weather. Notes are made of, for example, habitat condition, water levels, evidence of any changes in water level that may have occurred etc.

Findings from the water vole monitoring data

Influence of weather

Throughout the eight years of monitoring, the Environment Agency has tried to minimise the influence of weather on its results by avoiding monitoring following cold snaps, heavy rain or high water flows. However, 2007 was an exceptionally wet summer. The influence of that event on monitoring and results was unavoidable.

Figures 2 and 3 (Page 26) show how the number of latrines in the core 100 metres at two previously well performing sites fell in autumn of 2007 and had still not recovered by spring 2008. It is strongly suspected that the reason for this was the high rainfall in 2007 and associated summer flooding.

High water levels were seen in nearly all watercourses in the summer of 2007, submerging many water vole burrows. Consequently, water voles that did not drown would have been displaced from their burrows and placed at greater risk of predation. This would have caused a significant drop in the population consistent with a fall in field signs over the autumn and following spring, as reflected by the monitoring results.

Of course the findings could be explained by other factors as there are not enough data to be certain. It may have been that by chance, fewer latrines were found or potentially the results are simply reflecting a natural cycle in water vole numbers. Studies in Europe indicate a 4-8 year cycle in population numbers can occur

(Woodroffe, 2000). Or the fall in 2007-2008 could be part of a general trend towards lower numbers of water voles.

Figure 2. Latrine data for Buck Beck (core stretch) (Page 25)

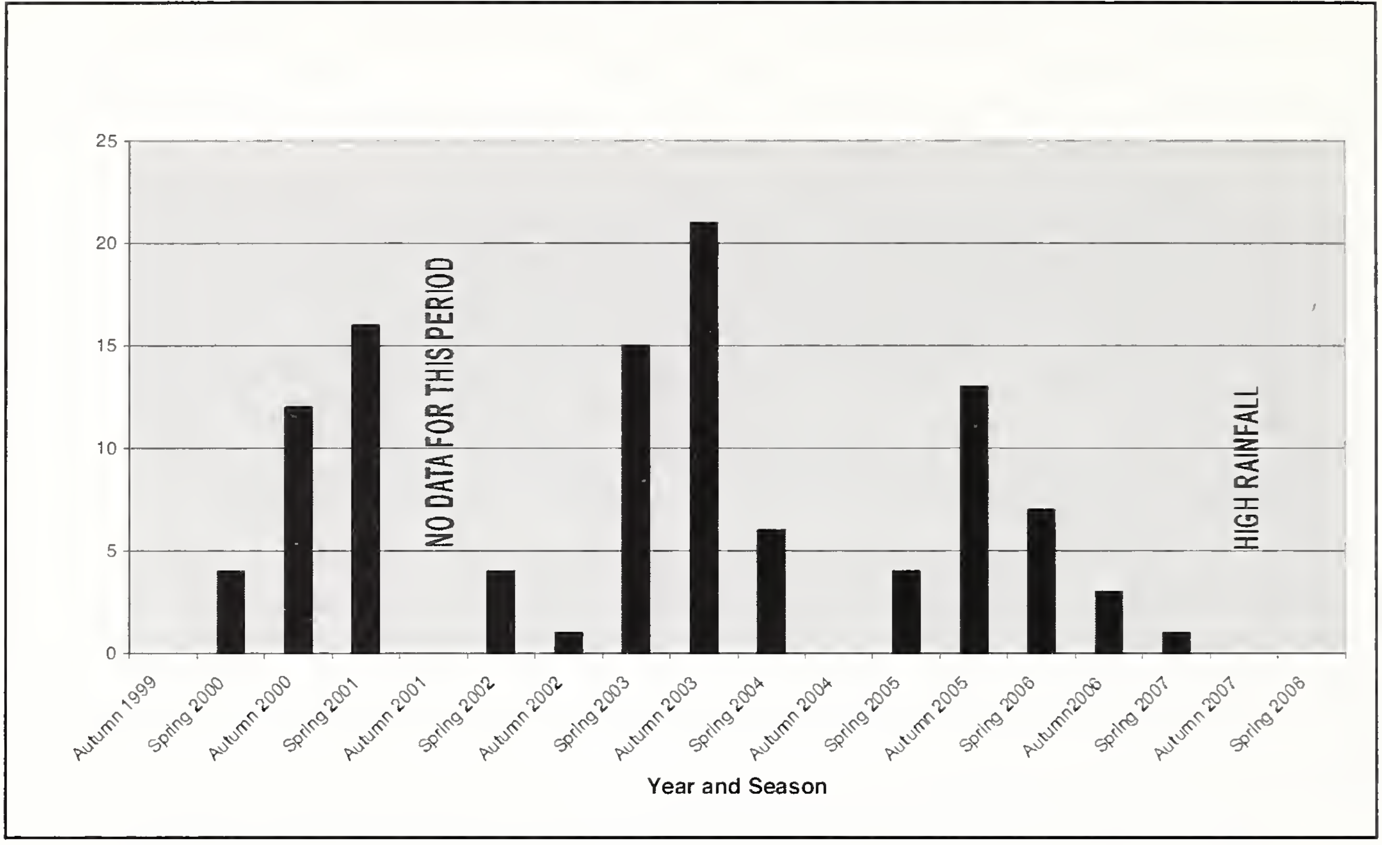
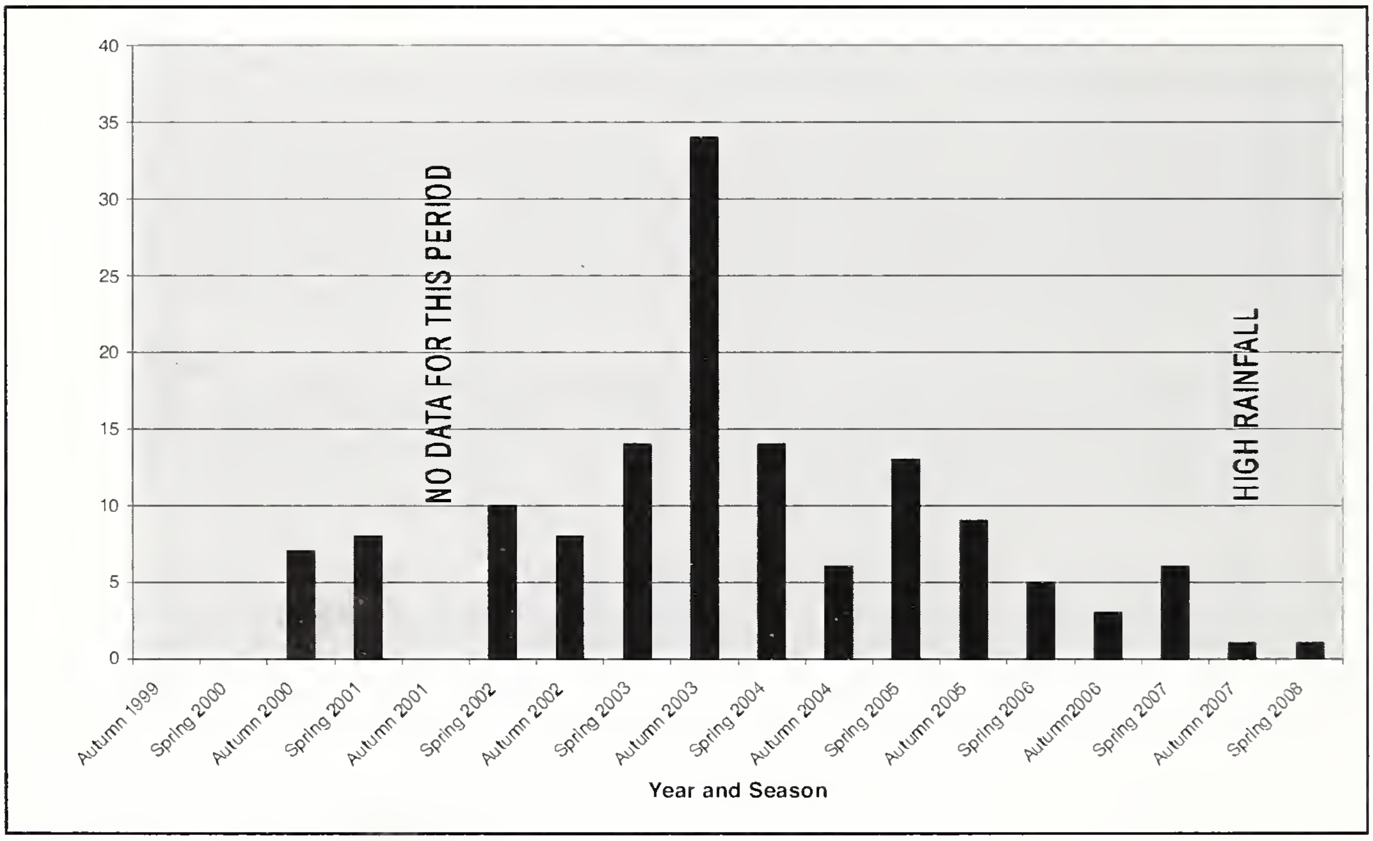


Figure 3. Latrine data for the River Steeping (core stretch) (Page 25)



The influence of survey effort

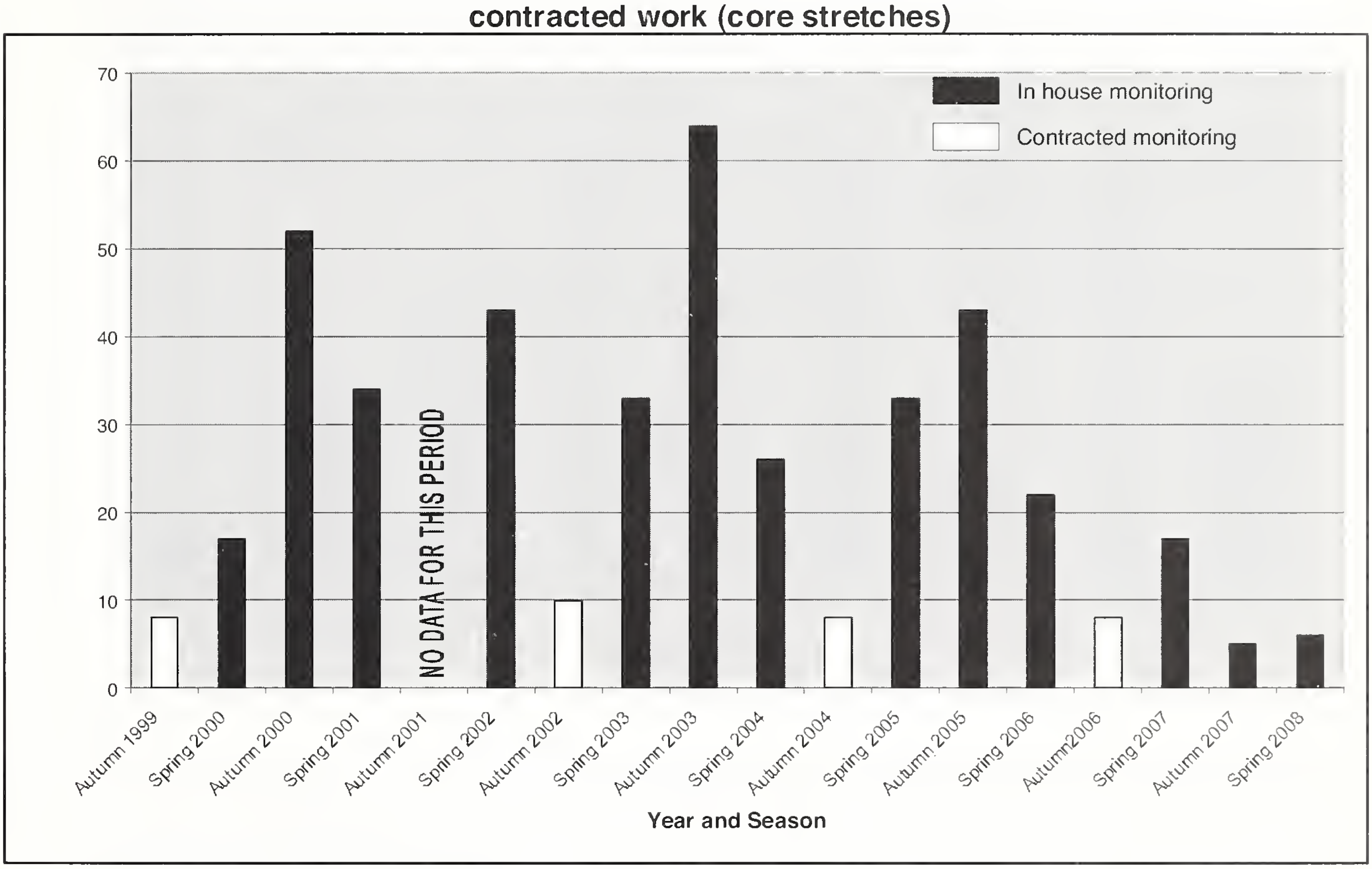
Due to the limited number of sites and the usual variability of ecological data, it has been difficult to find meaningful trends for the data. Whilst studying the results, with the aim of removing or controlling some of the variability, one non-ecological variable emerged as a strong influence on the data, namely survey effort.

The total number of latrines found in the autumn by contracted surveyors was always found to be smaller than the total found in the preceding spring by the Environment Agency. This is not how water vole populations are normally expected to change over time.

It is expected that total latrine numbers would in most years be greater in the autumn than in the spring. This is because water voles numbers peak in late summer/autumn (Woodroofe, 2000) and latrine numbers directly correlate with the number of animals at breeding sites (Strachan, 1997).

Autumn latrine counts were always greater in the autumn than the spring when the Environment Agency completed both sets of monitoring (except for the bad weather anomaly of 2007), consistent with expectations. This is illustrated in Figure 4.

Figure 4. Combined latrine data for all sites, differentiating in house and contracted work (core stretches)



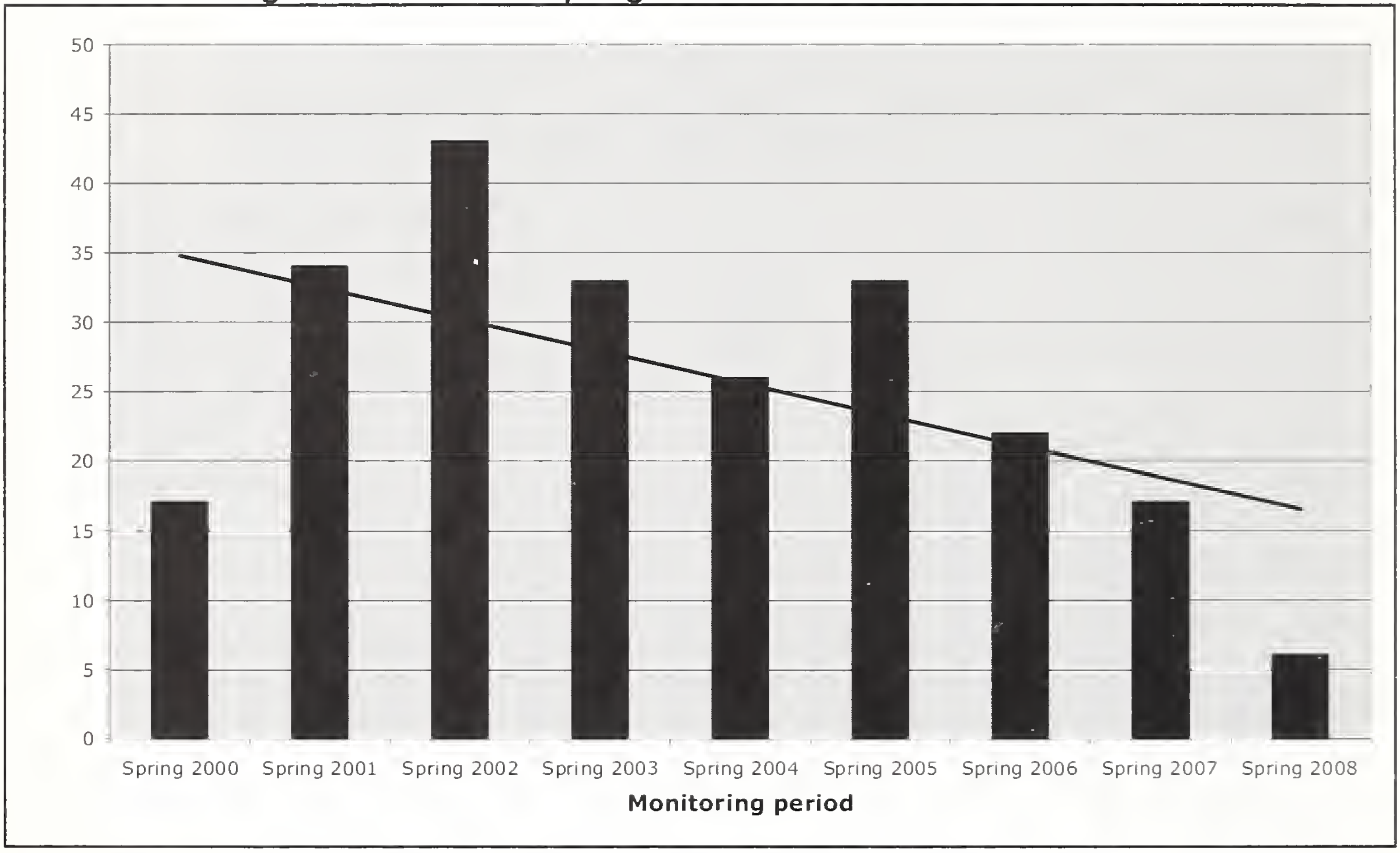
The difference between the two groups of collected data is probably explained by differing survey effort. The contract brief for the consultants was found to be not as specific as needed to be consistent with the Environment Agency approach, (the latter requiring double manning and a minimum of 40 minutes spent at each location). Consequently, the level of survey effort by contractors, whilst consistent with their contract brief, was lower than that of the Environment Agency. Much of the autumn water vole data could therefore be considered incomparable with the rest of the data. It highlights how important careful wording for monitoring and survey briefs needs to be.

In light of this problem, further analysis has concentrated on the information gathered during the spring that has all been gathered in exactly the same way.

General trend in Lincolnshire

Looking at total latrine numbers for all sites in spring, there appears to be a downward trend in the total number of latrines counted, suggesting an associated decline in water vole numbers (Figure 5). If the data are accepted as the best proxy we have for the wider population, it means that previous confidence in their general ability to buck the national trend may not have been well founded. It shows a decline in numbers, despite effort to ensure there is proper mitigation on all works affecting water voles in Lincolnshire.

Figure 5. Combined spring latrine data 2000-2008 for all core sites



Discussion

Regardless of the direction of the trend in numbers, mitigation for developments will continue due to this mammal's legal protection. Mitigation measures start with keeping impacts from development to a minimum. That may mean that developers expecting to carry out works that result in water vole habitat loss or fragmentation are asked to review their plans and determine if the overall footprint of the plan can be made smaller.

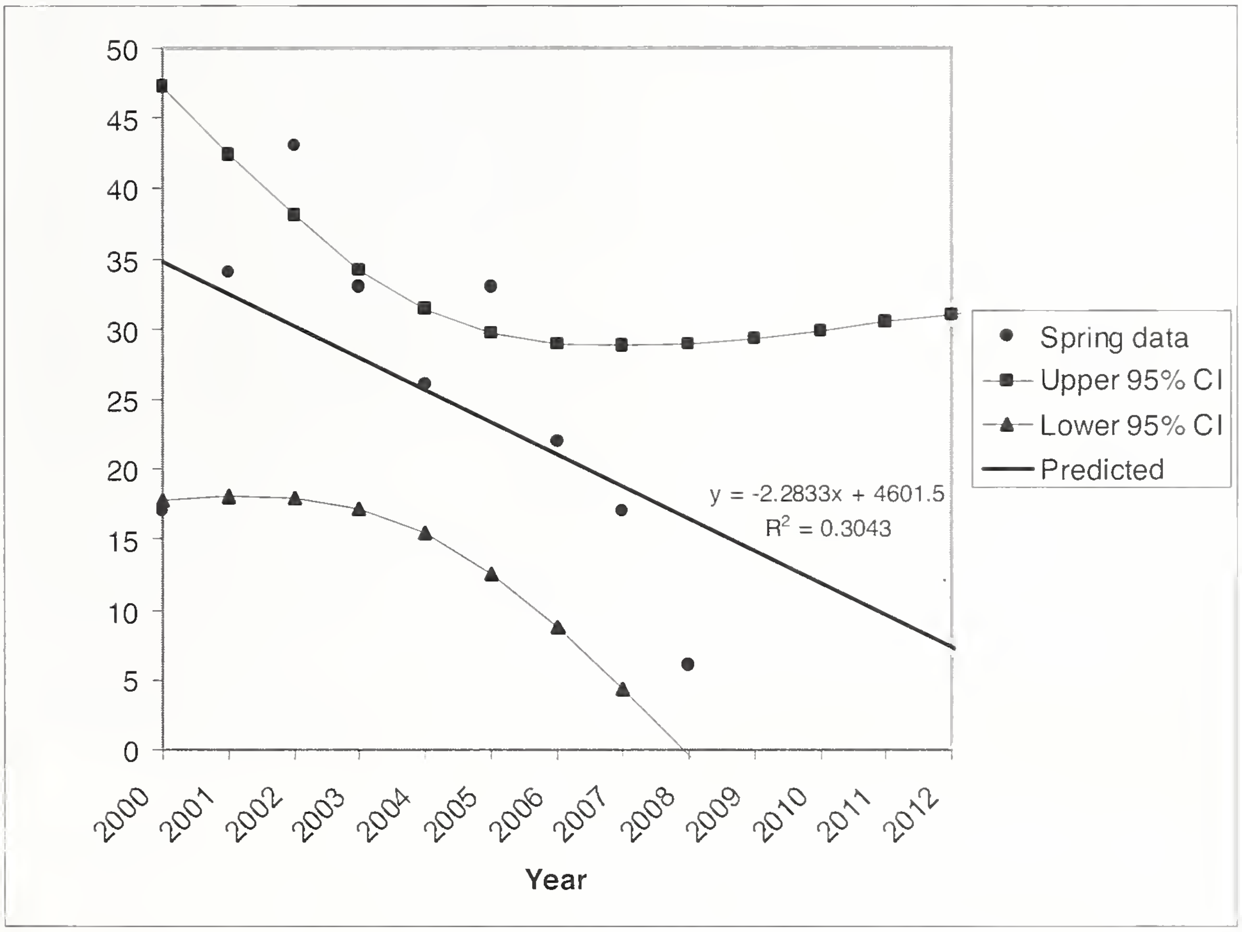
A good example of this is the practice of culverting water courses. By culverting a whole ditch, some developers see the creation of usable space that would otherwise be economically inactive. Obviously, from a water vole's perspective this can be a problem. In these circumstances it can normally be negotiated down to only the length required for access.

Even so, a developer may have to undertake a water vole displacement project before the works can begin. Whilst not necessarily expensive, this can be disruptive to development timetables. Proper project planning can minimise the impact of such work in terms of both time and money.

Culvert design can also be improved. The use of mammal ledges in culverts is encouraged by various organisations, including the Environment Agency and the Highways Agency. Ledges can help restore connectivity to fragmented populations and reduces the impact of new culverts.

As well as the work aimed at minimising the impact of development on water voles, there are many projects which either directly or indirectly, improve their prospects in Lincolnshire. Considering all the above, it is disheartening to find that the monitoring site data are suggesting a decline in water vole numbers. The trend line is not statistically robust ($R^2 = 0.3043$), which does offer some comfort. There are too few samples and too few sites. A statistician could easily demonstrate that these data mean very little. Furthermore, we cannot expect the actual population dynamics of water voles to behave as predictably as this line suggests.

Figure 6. Future trends for water vole latrines at all core sites (5% confidence intervals)



Equally, if the line is as steep as the data indicate, by the time there is statistical confidence in it, we may not have anything left to measure. Using this trend line to forecast a possible extinction date for water voles from the monitoring areas is impossible. It is asking too much of the limited data. I did try and it appeared to be 2015. But as Figure 6 (Page 29) demonstrates, statistically, the trend could go in any direction (95% CI).

Conclusions

Water vole data have been collected by the Environment Agency in Lincolnshire at specific sites over the past 8 years. Identifying trends within the data has been difficult. Weather and survey effort have both been identified as likely to affect the number of field signs found. Although these variables have influenced the results, some tentative conclusions can still be drawn.

The UK BAP targets for the species include maintaining the current distribution and abundance in order to arrest the decline of the species in Britain. The data do suggest a decline in field signs associated with water voles at the monitoring sites. Assuming these are an adequate representation of what is happening to water vole populations in Lincolnshire as a whole, we may be failing to meet the BAP targets at present.

This is despite the measures that have been put in place so far that are meant to protect them, so the current policies aimed at protecting water voles in Lincolnshire may need to be re-thought. Perhaps there needs to be even more aggressive policies for their protection. Maybe we should be creating areas managed specifically as large scale water vole reserves. Another possibility may be a mink eradication programme. One such project is already in the early stages, targeting the grazing marshes between Grimsby and Skegness. We know that mink have been increasing in Lincolnshire and that they present a significant problem for water vole populations. Targeting mink is an important addition to the overall water vole conservation strategy for Lincolnshire, but only time will tell if it is enough.

There is an uncomfortable but important question to be asked. Should we concede that there may come a time when conserving other less glamorous species becomes a more achievable and cost effective use of our limited time and money? There is the possibility that persisting with the current approaches to water vole conservation could become a significant drain on resources without necessarily achieving our goals. And in the meantime, potentially more saveable species could decline. A prudent response may be to ensure that the measures we take to further water vole conservation are carried out in a manner that benefit as wide a range of other species as possible.

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The views in the above article are the author's and do not necessarily reflect those of his employer.

LINCOLNSHIRE NATURAL HISTORY IN 2007

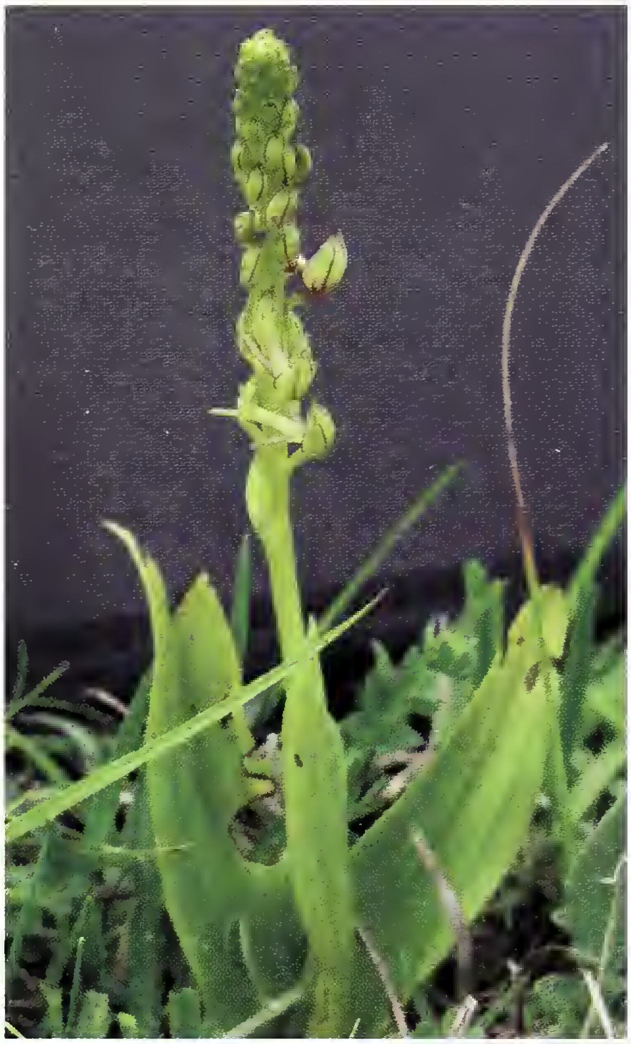
BOTANY

Paul Kirby

Six field meetings were held in 2007:

May 13	Minting Wood, TF17
June 10	Trent Bank, Dunham Bridge, SK87
July 8	Swanholme Lakes, SK96
August 19	Wainfleet MOD Range, TF55
September 9	Hardy Gang Wood, TF07
October 21	Grimsthorpe Castle, TF02. Fungus Foray

Comments on notable records from the field meetings are included in the general text.



Man orchid Claire Weaver

Man orchid *Aceras anthropophorum*; in May, Claire Weaver found two plants of this nationally scarce orchid on the High Barn SSSI in TF37. This is the first confirmed record from the chalk in the County, the first confirmed record for Vc54 and the most northerly site for the species in Great Britain.

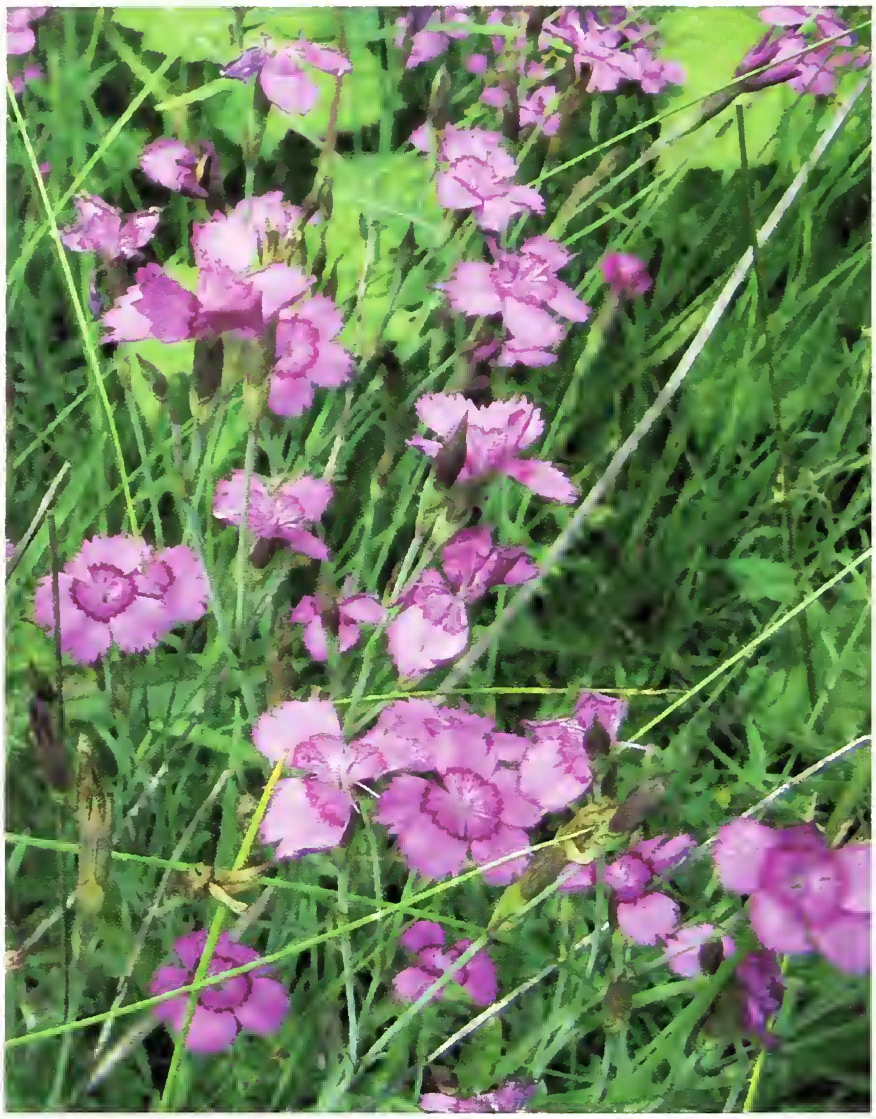
On May 23 the plants were just starting to flower. Sadly when the site was re-visited on May 29 (CW & PK) both spikes had gone - eaten off, presumably by rabbits.

Small populations of man orchid have been known in the past on the limestone in the south of the county but recently the only records have been from the Copper Hill PRV at Ancaster SK94. There are old unconfirmed records for the north of the county; South Ferriby, P. Pape, 1930 and Barton upon Humber, D. Witty, 1934 (Gibbons, 1975).

Maiden pink *Dianthus deltoids*; Phil Porter found 3 plants of this nationally scarce pink, flowering handsomely in acid grassland near Teal Lake in Whisby Nature Park, SK96. The striking features of the flowers were their deep pink colour and bold markings. This gave rise to concerns that the plants were of garden origin, a view strengthened by the presence nearby of another garden plant fox and cubs *Pilosella aurantiaca*.

However, based on the habitat and photographs, Alex Lockton (BSBI) declared the plants to be native.

The issues concerning plant origin, plant status and flower colour in maiden pink arose again in 2007 when a plant, 'of far more authentic shade than the dark pink Whisby plants', turned up in a border in PP's garden, where none had been planted or seen before!



Maiden pink Phil Porter

Dianthus deltoides is a plant of sandy grassland and although quite widely scattered across mainland Britain, it exists mostly as small isolated populations. It has always been a Lincolnshire rarity. There are past records, the last dated 1963, for the North Hykeham/Whisby area but recently it has only been found at Swanholme.

A sedge found in Southrey Wood, TF17, by David Harrison in July 2007 was determined as *Carex x pseudoaxillaris* (*Carex otrubae* x *C. remota*) by Arthur Chater, BSBI Carex referee. This is said to be one of the commoner hybrid sedges but it has rarely been recorded in Lincolnshire though both the parent species are widespread. It may well have been overlooked and should be searched for in locations where both parents are present. Look for sterile plants (empty utricles) and those that resemble robust plants of *C. remota* or slender plants of *C. otrubae* with well separated flower spikes and a large lower bract.

Maiden pink Phil Porter

Carex divulsa s.l., comprising grey sedge subsp. *divulsa* and Leers' sedge subsp. *leersii,* is another Lincolnshire rarity. Neil Harris and PK collected samples from several sites in Vc53 and sent them to Dr Michael Foley, the BSBI referee for this tricky taxon. The specimens from Ancaster Cemetery SK 94 and Cabbage Wood SK91 were determined as subsp. *divulsa*, that from Math and Elsea Wood SK91 as subsp. *leersii* and those from two plants in rough grassland at Carlby TF01 as intermediates. It is interesting to note that it is not always possible to assign all specimens to one or other of the subspecies and important to record such plants as intermediates.

Wild liquorice *Astragalus glycyphyllos*, small-flowered wintercress *Barbarea stricta*, henbane *Hyoscyamus niger* and spotted medick *Medicago arabica* were among a long list of plants made by Brian Hedley at the Trent Bank SK87 LNU Meeting.

He also recorded corn parsley *Petroselinum segetum* at two sites in Lincoln - 100+ plants on an industrial estate TF 0071 and 'growing almost as a weed' along the pavements by a car park in SK9972 - and made an interesting list of water plants from the South Carlton area SK9375: water violet *Hottonia palustris*, narrow-leaved water-plantain *Alisma lanceolatum*, arrowhead *Sagittaria sagittifolia*, flowering rush *Butomus umbellatus*, unbranched bur-reed *Sparganium emersum*, shining pondweed *Potamogeton lucens*, Nuttall's waterweed *Elodea nuttallii* and both ivy-leaved and lesser duckweeds *Lemna trisulca* and *L. minuta*.

Common calamint *Clinopodium ascendens* - Lincoln TF07 by both Keith Robertson and BH. This is a scarce plant in Lincolnshire.

Hairy buttercup *Ranunculus sardous* - at several sites where there was recently disturbed clay soil in the Killingholme area TA11, Andrew Taylor and Jeremy Fraser.

Marsh ragwort *Senecio aquaticus* - at both Butterwick Hale and Common SE 80 (JF & PK). 'Recorded for all divisions.... Uncommon. Decreasing', (Gibbons 1975). This species has now all but disappeared from the county.

Brian Laney and Paul Stanley could find only one plant of greater yellow-rattle *Rhinanthus angustifolius* at its Belshaw location SE70 and commented that the site was becoming overgrown with rosebay and nettles. Annual knawel *Scleranthus annuus* was present but they could find no blue fescue *Festuca longifolia*.

Sea couch *Elytrigia atherica* - a small patch of this coastal grass beside the A16 at Haugham TF38 (PK and CH). A further addition to the list of inland 'salties'.

Water bent *Polypogon viridis* - in late May Colin Hutchinson noted this grass growing on the pavement in Alford TF47. Its inflorescence resembles a beefed-up *Agrostis stolonifera* and has a distinctive 'jizz'. Later in the year the grass was found beside a pond at Farlesthorpe TF47 (PK and CH), in cracks in pavements in Louth TF37 (several sites, PK) and also Horncastle TF26 (CH and PK). It is a native of southern Europe and is now spreading rapidly in England. It is one to look out for. A new county record.

Chinese or house holly fern *Cyrtomium falcatum:* a single large plant on a brick wall in Newmarket, Louth TF38 (PK and Neil Timm). An escape, 'established in the Scilly & Channel Isles, and occasionally on warm, moist walls in towns in S and SW Britain' (Jermy and Camus, 1991). The Louth plant appeared to be long established on a cold, dry, north wall in north-east England! A new county record.

Cyrtomium falcatum (Page 33)
Paul Kirby

Glabrous rupture-wort *Herniaria glabra* - two plants were noted on a pavement in Louth TF38 (PK). A glance into the nearest garden revealed a huge patch of the plant with a plastic nursery label sticking out of the middle of it – *Herniaria glabra*, ground cover plant!

Guernsey fleabane *Conyza sumatrensis* - first recorded in Gainsborough by Tim Smith in 2006 has now been found on Alkborough Flats SE82 (PK) and in Louth TF38 (PK). There were further records of niger *Guizotia abyssinica* in 2007, see botany report for 2006 (Page 50): a garden at Messingham SE80 Mrs Pat Coles and Farlesthorpe TF47 (PK and CH).

Tim Smith found New Zealand pigmyweed *Crassula helmsii* colonising the filter beds at Brigg Sewage Works SE90.

Crassula helmsii
Tim Smith

The British Pteridological Society held a week-end meeting in North Lincolnshire in October visiting Moor Farm TF26, Kirkby Moor TF26, the Chambers Wood complex TF17, Laughton Forest SK89, the Flixborough 'five fern wall' and Alkborough School wall. Among their records were both subspecies of golden-scaled male-fern, *Dryopteris affinis* ssp. *affinis* at Kirkby Moor, in the Chambers Wood complex and Laughton Forest and *Dryopteris affinis* ssp. *borreri* at Kirkby Moor and in Laughton Forest - the hybrid fern *Dryopteris x deweveri* (*D. carthusiana x dilatata*) at Moor Farm and in Laughton Forest and the hybrid horsetail *Equisetum x litorale* (*E. fluviatile x arvense*) in Laughton Forest.

Many thanks to all who sent in records in 2007.

Key to initials in text

PK - Paul Kirby, PP, - Phil Porter, BH - Brian Hedley, CH - Colin Hutchinson, CW - Claire Weaver, JF- Jeremy Fraser

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ACULEATE HYMENOPTERA

Michael Archer

The interesting and important records received during 2007 are:

Chrysis mediata Linsenmaier – Hardy Gang Wood, Wragby, A.L. Phillips. Third Lincolnshire record;
Lasius umbratus (Nylander) – Low Hameringham, A. Dale. Second Lincolnshire record;
Crossocerus binotatus Lepeletier & Brullé – Hardy Gang Wood, Wragby, A.L. Phillips. Third Lincolnshire record;
Cerceris arenaria (Linn.) – Whisby Nature Park, Lincoln, P. Porter. New species for Lincolnshire;
Andrena cineraria (Linn.) – Bradley/Dixon Wood, Irby upon Humber, A.L. Phillips. Fourth and fifth records for Lincolnshire;
Bombus rupestris (Fab.) – Horse Shoe Point, R. Crossley. Re-appearance of this species, last record during 1950.

I would like to thank the following six persons for sending in records: R. Crossley, A. Dale, K. Robertson, A.L. Phillips, P. Porter and J. Flanagan.

BUTTERFLIES

Allan Binding

2007 will be remembered for the extreme weather conditions which affected both wildlife and many people. A hot, early spring gave way to storms and heavy torrential rain for sustained periods in June and July. The heavy rain and floods came at a time when many species of butterfly were larvae. Many of meadow species of butterfly were down in numbers, with a sudden drop in species numbers in middle to late August.

White admiral also had a poor year. Some recorders reported no sightings of this species at its regular locations. Peacock butterflies seemed to pick up in numbers in August and became quite common.

Grizzled skipper, which is now mostly restricted to southern Lincolnshire, was found at a new location by Brian Hedley on the 23 May and the 7 June just south of Long Bennington.

A single Camberwell beauty was seen by Stephen Pinder on the 8 March at Pickerings Meadow Lincolnshire Wildlife Trust Reserve. This specimen is believed to have over-wintered nearby. This was the second earliest sighting of Camberwell beauty in England in 2007. Two Camberwell beauty were seen in August. One was seen at Laceby Acres, Grimsby on the 23rd of the month by John Walling and the other was seen by Ron Ansley at Epworth on the 25th.

Very few clouded yellow were reported in 2007. Only painted lady and red admiral were commonly seen.

I welcome all Lincolnshire butterfly records each year and can supply recording forms if required.

I am very grateful to all those LNU Members who sent in butterfly records in 2007 year.

FRESHWATER INVERTEBRATES

Richard Chadd

A fairly rare mayfly, the scarce olive *Baetis buceratus* (Eaton) has begun to appear more frequently in Lincolnshire's rivers. It is a widespread but localised species in Britain, completely absent at present from northern England and Scotland. Strictly riverine, it occurs in its larval form in gravelly riffles. Prior to 2006, the species had only been recorded twice in Lincolnshire, in 1986 and 1993, but by the end of 2007, 3 new records had been obtained. The 2007 record was from the River Welland at Deeping.

A new species of lesser water boatman, *Sigara iactans* Jansson, was found in the Coronation Cut of the River Welland at Spalding in late October. This is an immigrant species, its native range extending across continental Europe to The Netherlands. It recently arrived in south-east England and will probably become established throughout the Welland and other Lincolnshire rivers in the near future (it has already been found near the source of the Welland in Northamptonshire). Whether the increase in range of this species represents a climate change signal is open to debate.

A Nationally Notable species of crawling water beetle, *Haliplus* (*Haliplinus*) *apicalis* Thomson, was found in late 2007 in the brackish reaches of the South Holland Main Drain. The species favours brackish waters, where it feeds on filamentous algae. It is not new to Lincolnshire – there are 8 known grid square occurrences, mostly around The Wash – but the record represents a 9th grid square for the species here.

Another Nationally Notable species, this time a scavenger beetle, *Helophorus dorsalis* (Marsham) was found in a sample from the Upper River Witham at Easton Park in May 2007. This is a puzzling record, as the species is usually associated with muddy, leaf-filled pools in woodland, not in riverine environments. The flow of the Witham in May 2007 was, however, very low prior to the June floods. It is possible that the species was surviving in stagnant marginal pools around the river, which at Easton Park, has a substantial tree-cover.

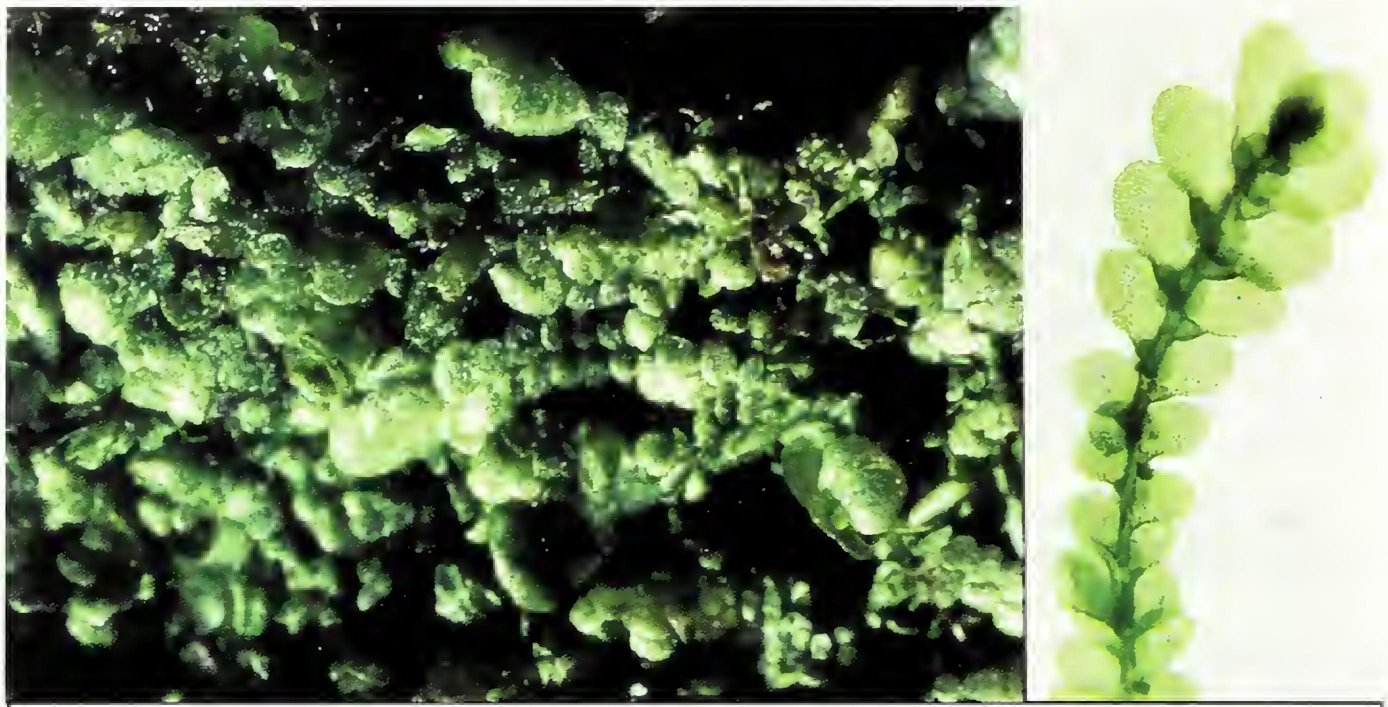
Two rare species of riffle beetle, *Oulimnius major* (Rey) and *Oulimnius rivularis* (Rosenhauer) continued to appear from time to time in 2007. The species are respectively Red Data Book 3 (Rare) and Nationally Notable and, particularly the latter, characteristic of relict fen systems. *O. major* was found in the Orby Drain at Chapel St. Leonards in October 2007, the South Holland Main Drain at a similar time of year, and the Cross Drain SSSI and South Drove systems near Spalding in March and May 2007. The SHMD record represents a new grid square for the species. *O. rivularis* was found in the lower River Ancholme, where it had previously been recorded, and in the Hobhole Drain at Midville, north of Boston, where it had not. This is, therefore, also a new grid-square record. A minute (1.5 mm) and rather scarce scavenger beetle, *Limnebius nitidus* (Marsham), was found together with *O. major* in the Cross Drain SSSI.

BRYOPHYTES

Christine Rieser

Bryophytes benefited from the wet summer season in 2007 in spite of a dry spring. Most epiphytes continued to spread and some were recorded from new sites. A few species appear to have been lost from individual sites. We have two new records for Lincolnshire, both from Vc54

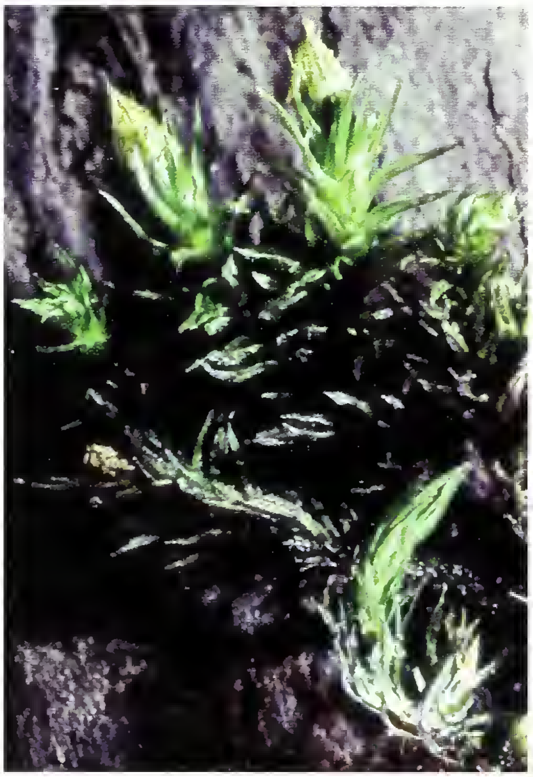
Lejeunia cavifolia, one of the very slender leafy liverworts, was found in small quantity at the base of a coppiced ash in Swinn Wood. This is new to the county and an exciting find as all *Lejeunia* species are only very rarely recorded from the east side of the country which reflects the drier climate here.



Lejeunia cavifolia (Page 37) Christine Rieser

The Swinn Wood site had other uncommon leafy liverworts also on old, coppiced ash. In particular *Frullania tamarisci* was a welcome find as our only other known site for this species has been almost overtaken by the common branched moss *Hypnum resupinatum*. Another leafy liverwort *Porella platyphylla* was also found here and is only known from two other sites in Lincolnshire.

Lophocolea semiteres, the leafy liverwort which is a recent introduction from America has been found at Ostlers Plantation and at Moor Farm, further evidence of its active spread on sandy soil, but last year's find at Linwood Warren has apparently been overcome by fast growing *Hypnum jutlandicum*.



Orthotrichum striatum Christine Rieser

The moss *Orthotrichum striatum* is a new epiphyte for Lincolnshire. It was found on willow at Hagworthingham in an area of woodland alongside the stream. This has been one of the later Orthotrichums to return in the country generally, after the improvement in air quality

Inspection at the Waithe Beck, Luds Well at Stainton le Vale and River Rase, Churn Water head at Bully Hill revealed a lush growth of plants suited to this environment among them *Palustriella commutata* with *Rhynchostegium riparioides* and *Pellia endivifolia* indicating calcareous water.

Some survey work by Richard Chadd on the River Welland, at Deeping St. James gave us a luxurious specimen of *Fissidens crassipes*, an uncommon moss found in fast flowing water over limestone. The identity was confirmed by the marginal cells of the sheathing lamina of the leaf seen under the microscope.

MAMMALS

Chris J. Manning

Introduction

Most of the county's mammal records are awaiting digitisation and until this process is completed analysis is difficult. Recording effort in 2007 was supplemented by the work of the Internal Drainage Boards with the Isle of Axholme and Lindsey Marsh Drainage Boards collecting water vole *Arvicola terrestris* sightings and badger *Meles meles* sett locations, all of which were digitally forwarded to the Lincolnshire Environmental Records Centre. In conjunction with the Deer Initiative, the Lincolnshire Deer Group organised thermal imaging surveys in South Kesteven and the Tumby/Woodhall area to assess deer density, with 83 records of fallow deer *Dama dama* comprising 848 individual animals.

In addition to the IDB records, a total of 751 records were entered on the database in 2007, not surprisingly the most commonly recorded species was the fallow deer with 107 records with brown hare *Lepus europaeus* (87), grey squirrel *Sciurus carolinensis* (75), badger (72) and hedgehog *Erinaceus europaeus* (58) the four next most commonly recorded species. The five least recorded species were water shrew *Neomys fodiens* (2), common vole *Microtus arvalis* (1), mole *Talpa europaea* (1), red deer *Cervus elaphus* (1) and red squirrel *Sciurus vulgaris* (1).

The sighting of a red squirrel at Rigsby would be the highlight of the year if native, however it is thought to be an escapee from a local collection as are previous reports of this species from the Barton area. Seven records of Otters *Lutra lutra* in 2007 comprised only one sighting and unfortunately two road casualties – both carcases collected by the Environment Agency for their ongoing research.

The lack of Muridae and Soricidae records suggest that LNU members don't keep cats, or perhaps they are embarrassed to report the results of their cats hunting exploits. Given the scarcity of small mammal sightings, records of cat kill are welcome.

Twelve recorders provided more than 10 records during the year: D. Clarke, B. Cunnington, B. Hedley, D. Jam, V. Kirton, R. Labbett, I. Misselbrook, R. Parsons, K. D. Robertson, S. Routledge and M. West. While some recorders compiled written reports, the Wildnews Bulletin was used by D. Clarke, I. Misselbrook and R. Parsons for all their records, with records also retrieved from the Lincolnshire Bird Club forms from S. Routledge and M. West. Not all these recorders are LNU members.

CONCHOLOGY (NON-MARINE MOLLUSCS)

E.J. Redshaw

The Union 'garden survey' at Colby in July produced only 15 species from a large area of grassland surrounded by a high limestone wall, together with the cottage garden. The slugs *Boetgerilla pallens* worm slug, *Arion distinctus* and the snail *Ena obscura* were the only new records for the 10km square SK96.

Another record of *Mytilopsis leucophaeta* false dark mussel has been provided by Martin Gammel who found specimens during routine EA sampling in the Maud Foster Drain at Rawson's Bridge TF34, near Boston, in November 2006. This is the third record for the county and the fifth and most northerly record for Britain.

I am grateful to Colin Smith for providing new records and for sending specimens for identification. New 10km records of interest include the first ever records from TA40. So far as I am aware no one has ever recorded in this marginal square which is about 80% marine, certainly there are no dots in the published atlases. The new records were of *Valvata excentrica, Valvata costata*, *Cernuella virgata* and *Oxychilus cellarius.* His other new 10km square records include *Euconulus alderi* from Louth Canal bank near Fire Beacon Bridge TF39; this species replaces *E. fulvus* in damp situations. There was also a good scatter of *Vallonia* and *Carichium* species.

MOSSES, LIVERWORTS AND LICHENS

M.R.D. Seaward

The county's bryophyte and lichen floras are undoubtedly undergoing a remarkable change, mainly for the better, not only as a result of reduced levels of atmospheric pollutants derived from industry, power stations and domestic sources but also as a result of increasing levels of nitrogenous products derived from agricultural practices and animal husbandry. As a consequence of such amelioration processes, diverse and luxuriant epiphytic communities are now to be witnessed throughout the county, even in urban areas where a wide range of habitats and substrata can support a very diverse flora. In the case of epiphytic bryophytes, there has been a remarkable increase in numerous species of liverworts and in such mosses as *Cryphaea heteromalla* and various species of *Orthotrichum*, *Ulota* and *Zygodon*, many of which have not been recorded since the 19th century. Similar dramatic improvements have also been witnessed in the case of epiphytic lichens, not only of foliose forms (e.g. *Parmelia* s. lat.), but also of crustose forms, more particularly some *Lecanora* spp., either new for the county or unrecorded since the 19th century; which are particularly noticeable as conspicuous white flashes on young trees, their establishment on mature trees deterred by bark acidification built up over decades under former air polluted regimes.

A further 34 churches (some redundant or adapted for a different purpose) and their churchyards as well as four churchyards with demolished churches were investigated for the first time and three churches were revisited by the author in 2007 as part of the British Lichen Society's churchyard survey; to date, 523, representing more than 76% of the Church of England churchyards in the county, have been researched.

The moss and liverwort records, contributed by F.R. Lammiman (FRL), C. Rieser (CR) and C. Wall (CW), are for 2007 unless otherwise stated. The lichen records, unless otherwise stated, were made by the author in 2007, who is most grateful to Dr B.J. Coppins, Royal Botanic Garden, Edinburgh, for his identification/confirmation of the more critical material. As a consequence of this bryological and lichenological work, three county, five vice-county, 50 divisional and innumerable grid square records have been added to our registers. The nomenclature is mainly according to T.L. Blockeel and D.G. Long (1998) *A Check-list and Census Catalogue of British and Irish Bryophytes* and to B.J. Coppins (2002) *Checklist of Lichens of Great Britain and Ireland.*

Mosses

Brachythecium populeum (Hedw.) Bruch, Schimp. & W.Gümbel + 1 (July 2006, CW; first North Lincolnshire record since 1915)
Cryphaea heteromalla (Hedw.) D. Mohr + 10 (CW)
Dicranella schreberiana (Hedw.) Dixon + 11 (FRL & CR)
Didymodon luridus Hornsch. ex Spreng. + 1 (CW)
D. vinealis (Brid.) R.H.Zander + 1 (July 2006, CW)
Encalypta streptocarpa Hedw. + 1 (Nov. 2004, CW)
Fissidens pusillus (Wilson) Milde + 4 (FRL & CR)
Gyroweisia tenuis (Hedw.) Schimp. + 1 (July 2006, CW; first North Lincolnshire record since 1911)
Hygrohypnum luridum (Hedw.) Jenn. + 1 (on crumbling stone slab beneath N-facing wall, Epworth church, July 2006, CW, **VCR**)
Leskea polycarpa Hedw. + 11 (FRL & CR)
Orthotrichum affine Brid. + 1 (Nov. 2004, CW)
O. cupulatum Brid. + 1 (July 2006, CW)
O. lyellii Hook. & Taylor + 1 (Nov. 2004, CW)
O. striatum Hedw. + 10 (on *Salix*, Hagworthingham, Feb. 2007, CR & FRL, **NCR**)
Rhynchostegium murale (Hedw.) Bruch, Schimp. & W. Gümbel + 1 (Aug. 1987, CW)
Syntrichia virescens (De Not.) Ochyra + 1 (July 2006, CW)

Liverworts

Leiocolea turbinata (Raddi) H. Buch + 1 (Nov. 2004, CW)
Lejeunea cavifolia (Ehrh.) Lindb. + 11 (April 2007, FRL & CR; first Lincolnshire record since the 19th century)
Lophocolea semiteres (Lehm.) Mitt. + 10 (FRL & CR)
Metzgeria furcata (L.) Dumort. + 1 (Nov. 2004, CW)
Porella platyphylla (L.) Pfeiff. + 11 (FRL & CR)

Lichens

Acarospora umbilicata Bagl. + 16 (on table tomb, Edenham church, Aug. 2007, **VCR**)
Anisomeridium biforme (Borrer) R.C. Harris + 11 (on *Acer campestre*, Driby, May 2007, **NCR**)

Arthonia radiata (Pers.) Ach. + 11
Belonia nidarosinensis (Kindt) P.M.Jørg. & Vězda + 3
Caloplaca crenulatella (Nyl.) H. Olivier + 2
C. ruderum (Malbr.) J.R. Laundon + 5, 11
Candelariella reflexa (Nyl.) Lettau + 2
Cliostomum griffithii (Sm.) Coppins + 2
Flavoparmelia soredians (Nyl.) Hale + 2
Hyperphyscia adglutinata (Flörke) H. Mayrhofer & Poelt + 11
Hypogymnia physodes (L.) Nyl. + 2
Hypotrachyna revoluta (Flörke) Hale + 2
Lecania cyrtella (Ach.) Th.Fr. + 13 (on *Sambucus*, Skellingthorpe, Oct.2007, **VCR**)
Lecanora carpinea (L.) Vain. + 7, 11
L. chlarotera Nyl. + 2
L. intricata (Ach.) Ach. + 10
L. persimilis (Th.Fr.) Nyl. + 10 (on *Fraxinus*, Raithby-by-Spilsby, June 2007, **VCR**)
Lepraria lesdanii (Hue) R.C. Harris + 11
Melanelia subaurifera (Nyl.) Essl. + 2
Mycoblastus fucatus (Stirt.) Zahlbr. + 6
Parmotrema perlatum (Huds.) M. Choisy + 2, 11
Peltigera canina (L.) Willd. + 13 (Whisby Nature Park, March 2007, P. Porter, **VCR**)
Physcia aipolia (Ehrh. ex Humb.) Fürnr. + 2 (on *Populus*, Central Park, Scunthorpe, June 2007, **NCR**)
Platismatia glauca (L.) W.L. Culb. & C.F. Culb. + 11
Punctelia ulophylla (Ach.) Herk & Aptroot + 2, 11

MOTHS

Colin Smith

The 2007 season started well with some very early records for many species but then the heavy rains and flooding in June changed the situation and in general, light trapping from then on was mediocre. 20,000 records have been submitted so far but there are quite a few recorders who have not yet sent me their records. There are now about 40 recorders sending in significant numbers of records and several of these are new this year. A total of 962 species have so far been recorded with 442 macros and 520 micros.

Migrants

Surprisingly after the massive influx last year migrants were very scarce in 2007. Humming-bird hawk-moths *Macroglossum stellatarum* were on the wing as early as February showing they were able to survive hibernation. Two bedstraw hawks *Hyles gallii* were seen, one in May in the Market Rasen area probably from a now resident population. Another was caught by Mr G. Wright at Muckton, a migrant on 22nd August. The only convolvulus hawk *Agrius convolvuli* seen, was at Louth by Mr R. Labbett on 24th August. Liz White caught a least carpet *Idaea rusticata* near Frampton on 28th July, the second for the county and new to VC53; the first record was only last year. Twelve great brocades *Eurois occulta*, twelve large thorns *Ennomos autumnaria* and seven dark swordgrass *Agrotis ipsilon* were the only other migrants of note other than a delicate *Mythimna vitellina* caught by Mr K. Robertson at Roughton on 15th July.

Macromoths

Goat moth *Cossus cossus*; caught by Mr B. Hancock at Boston on 6th August and was the first record this far north for many years. Autumn green carpet *Chloroclysta miata*; two of these were seen by Mr N. Parsons at Sutton on Sea in September, a species with very few records and all previously from woodland sites. Mottled grey *Colostygia multistrigaria*; a single specimen was caught by Mr C. Smith at Wickenby Wood 15th March, the first record away from the coast since the 1980's. Chocolate-tip *Clostera curtula*; the first record for the Limewoods since the 1970's was seen by Mr C. Smith at Hardy Gang Wood on 19th April. Small yellow underwing *Panemeria tenebrata*; this seldom recorded little moth was seen in three places this year. Mr J. Clarke found one in his garden 22nd May and Mr K. Robertson found about 20 near West Ashby 20th May.

Currant clearwing Roger Labbett

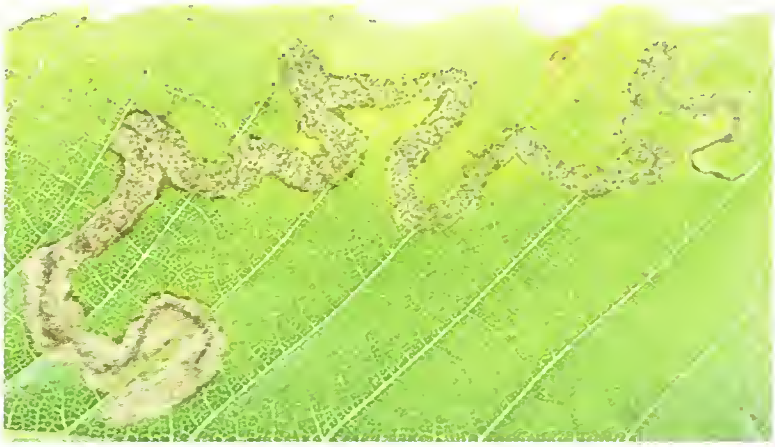
Mr M. Gray worked very hard during the year to find clearwing species using pheromone lures that attract the male moths by mimicking the female. He had his first success in Gainsborough with ten currant clearwings *Synanthedon tipuliformis* on 21 June. Spurred on by this success, Mr R. Labbett also found one in Louth. Red-belted clearwing *Synanthedon myopaeformis* was his next find in his garden at Broadholme 26 June. Then on the 2nd July whilst looking for hornet moths emerging from poplar trees he found a pair of lunar hornet moths *Sesia bembeciformis* at Upton (Page 60). Six belted clearwing *Bembecia ichneumoniformis* at Greetwell Hollow on the 5th July was the next species.

Six belted clearwing Roger Labbett

He also found the last one in VC54 in 1987. Mr P. Porter also caught one by sweeping at Whisby Nature Park on the 10th July. His final success was at Barlings Pits where about 7 or 8 red-tipped clearwings *Synanthedon formicaeformis* came to the lure also on 5th July (Page 60).

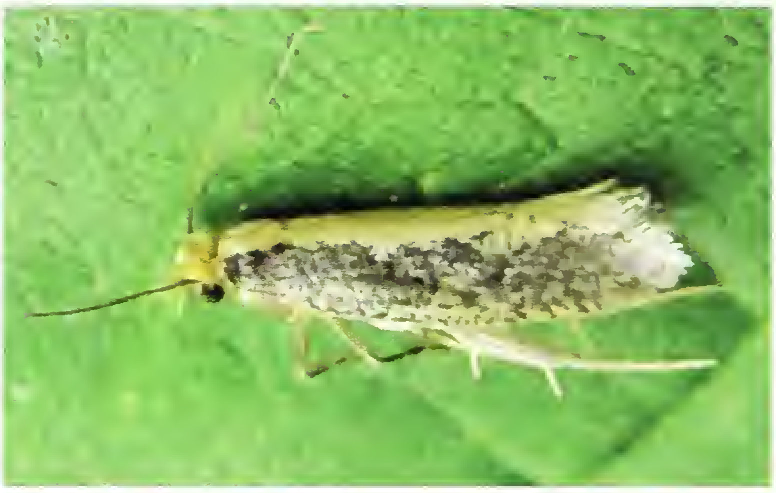
Micromoths

There have been eleven new species for the county and sixteen new vice county records during the year as well as many other interesting records some of which are listed below.



Stigmella samiatella at Eagle Moor by Mr M. Gray on 3rd November, a new county and VC53 record. Also at Gainsborough High School by Mr M. Gray on 16th November. A new VC54 record. Both leaf mines on sweet chestnut.

Stigmella samiatella gallery mine
Martin Gray



Monopis crocicapitella at Kenwick Park, Louth by Mr R. Labbett on 23rd May. A new county record.

Monopis crocicapitella
Roger Labbett

Azalea leaf miner Caloptilia azaleella at Roughton by Mr K. Robertson on 15th July. A new county record.
Phyllonorycter platani at Willingham Forest by Mr C. Smith on 14th October, a new VC54 record. Leaf mines on London plane.
Phyllonorycter lantanella at College Wood by Mr C. Smith on 6th October, a new VC54 record. A leaf mine on guelder-rose.
Horse chestnut leaf miner *Cameraria ohridella* found in large numbers in nine ten kilometer squares mostly between Lincoln and Grimsby. New for VC54.
Argyresthia aurulentella at Willingham Forest by Mr C. Smith on 7th September. A new VC54 record.
Argyresthia trifasciata at Kenwick Park Louth by Mr R. Labbett on 23rd May. A new VC54 record.
Acrolepia autumnitella at Skellingthorpe by Mr C. Smith on 1st February. A new VC53 record.
Coleophora fuscocuprella at College Wood by Mr C. Smith on 6th October. A new VC54 record larva. Found on hazel.
Coleophora therinella – at Morkery Wood by Mr R. Goff on 22nd June. A new VC53 record.
Coleophora saxicolella at Broadholme by Mr M. Gray on 17th July. A new VC53 record.

Coleophora taeniipennella at Whisby Nature Park by Mr C. Smith on 14th July. A new VC53 record.
Coleophora clypeiferella at Broadholme by Mr M. Gray on 15th July. A new VC53 record.
Pseudatemelia josephinae Mr C. Smith caught three individuals at Osgodby Moor and in Willingham Forest in June and July. A new county record.

Agonopterix scopariella at Woodhall Spa Golf Course by Mr R. Labbett on 24th April. A new county record.

Agonopterix scopariella
Roger Labbett

Monochroa hornigi at Burwell and Haugham Woods by Mr R. Labbett on 22nd June. A new VC54 record (Page 60).

Monochroa lutulentella
Martin Gray

Monochroa lutulentella at Broadholme by Mr M. Gray on 26th July. A new VC53 record.
Recurvaria leucatella at Willingham Forest by Mr C. Smith on 16th July. A new county record.
Brachmia inornatella at Willingham Forest by Mr C. Smith on 16th July. A new county record.
Mompha jurassicella at Willingham Forest by Mr C. Smith on 7th September. A new county record.
Hysterophora maculosana - at Morkery Wood by Mr R. Goff on 7th July. Not seen in the county for over one hundred years.
Cnephasia genitalana at Kate's Bridge by Mr R. Goff on 13th June. A new VC53 record.
Acleris schalleriana at Whisby Nature Park by Mr P. Porter on 27th August. A new VC53 record.
Epinotia fraternana at Morkery Wood by Mr R. Goff on 20th May. A new county record.
Dichrorampha sequana at Kate's Bridge by Mr R. Goff on 1st June. A new VC53 record.
Nephopterix angustella at Langworth by Mr C. Dobson on 20th June. A new county record.
Euleioptilus carphodactyla at Risby Warren by Mr C. Smith on the 7th June. A new county record.

MYCOLOGY

Ken Rowland

Again it was a very peculiar year fungi-wise. I could very nearly repeat the first few paragraphs of last years report as we all now appreciate May, June and July were rather wet. I recorded some 520mm (20 inches) of rain which was rather excessive for the fungi (and everything else) which generally like rather dry conditions at this period. Later in August and September when they like some moisture, it was dry. So come the Foray season a lot of species didn't bother to show up, notably the Russula and Lactarius species and these were scarce throughout the whole season. Another notable slow starter was the fly agaric *Amanita muscaria*, normally quite prolific early in the season but not this year.

Earlier in the year *Calocybe gambosa* St. Georges mushroom appeared on the 14th April some nine whole days before St George's Day on the 23rd. It is most unusual to be as early as this, or is it climate change? If it is, then we may find some very peculiar things happening even in the fungus world.

The Forays I have led this year have for the most part been disappointing in both quantity and quality of species found. This does make the role of leader most difficult, having to scratch around to find brackets and last year's puff balls. To give an idea of the problem, a Foray for the Lincolnshire Wildlife Trust at Snipe Dales in early October was like a desert with only forty nine species found when I would expect at least a hundred on this site. Here it was reported to me that the Cosican pines were suffering from 'needle blight' a fungus disease which I think is *Sydowia polyspora*, which I need to check. In any case it will be a new unwelcome county record as it means all the infected trees will have to be felled, a process already underway. Hartsholme, Swanholme and Chambers Wood all gave very disappointing results; only about half of the usual number of species was recorded with nothing out of the ordinary.

The annual LNU Fungus Foray was held at the Grimsthorpe Estate and we were very admirably escorted by the Park Ranger, Chris Howes, even to the extent of the use of the estate mini-bus for transport. Again, only forty seven species were recorded with nothing very exciting. There was a very good showing of *Coprinus comatus* (the shaggy ink cap) with some forty or fifty caps in the gravel of the car park (quite a show!), and then later, a stubble field full of *Volvariella speciosa* now *gloiocephala* (stubble rosegill) and some very good looking specimens of *Ganoderma lucidum* (the lacquered bracket) were found on an old stump; these made the visit worthwhile. The latter species, ling chi in Chinese, or the mushroom of immortality, has been known for some two thousand years in China and Japan and is even today a very expensive and highly valued product, so Grimsthorpe could possibly go into production. A complete list of its attributes would take up too much space but it would seem to be a cure for nearly everything.

A Fungus Foray at Whisby Nature Park mid-October did turn up a few more species, one in particular on sycamore chippings turned out to be *Agrocybe rivulosa*, a migrant from the continent (also a new county record) which has been appearing over most of the country this year on wood chippings, eg, in a Walesby garden. I have also found it at Clumber Park so it would seem to be getting pretty well established in spite of any new immigration laws. It seems particularly fond of wood chippings as all of the specimens found up to now have been on this substrate.

At a later visit to Whisby to meet the Lincolnshire Echo, whilst waiting to meet the reporter, I was browsing round the garden near the Centre when I came across a colony of birds' nest fungi *Cyathus olla* on chippings. They had obviously been there all the summer but in a place you don't think of looking. At the end of December, Phil Porter brought me a rather sad looking Myxomycete (slime mould). After a couple of days study it turned out to be *Badhamia capsulifer*, another new county record.

I have received the usual report from Ann Ward (from Mansfield) for Saltfleetby-Theddlethorpe NNR. She has now recorded four species of earth star on this site, the latest being *Geastrum fornicatum* (a new county record), which brings this site on a level with Gibraltar Point NNR. Although different species are found at both sites, these coastal sites are favoured by the earth stars. She also included a good list of other more common species. It is always good to receive lists from non-members and people out of the county; it shows there is an interest in Lincolnshire outside its boundaries.

The usual long list has arrived from Keith Robertson which I am still trying to sort out, so any exceptional records will have to be reported on next year.

Climate change may be having an influence on the fruiting of fungi. My records, which date back to 1987, show that the annual rainfall is increasing, most of which is falling at the wrong time of year for the fungus i.e. in May to July when they like it dry, they then like to have some rain between August to September. For the last year or so conditions have been the wrong way round.

This year I have had some 625 specimens which is about half of that which we used to get when Jack Houghton was fungus recorder. However, the lack of specimens this year was made up for by the extra media interest and publicity. The Fungus Forays attracted two interviews on BBC Radio Lincolnshire, a slot on BBC Television's Look North and two full pages in the Lincolnshire Echo. It was somewhat difficult to find specimen to talk about, especially when the first question is 'Can you eat it?', but it does stimulate a lot of interest in the subject.

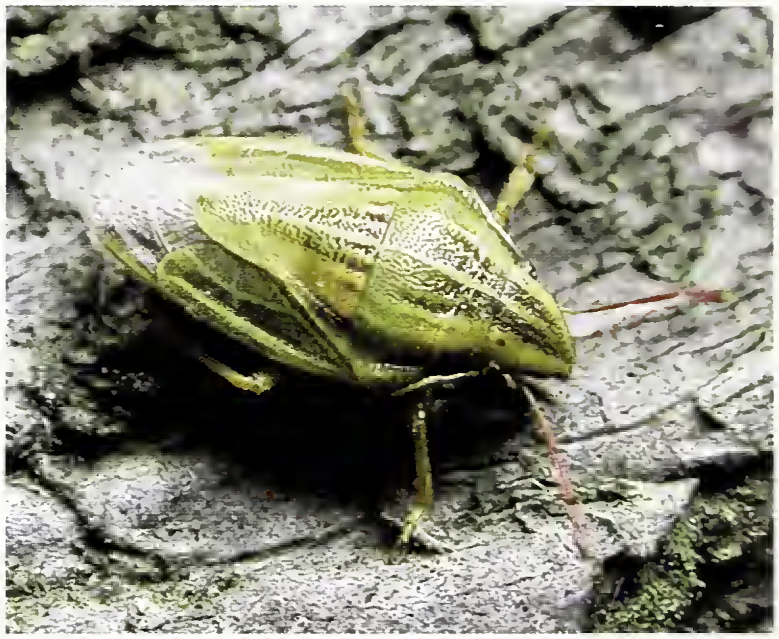
Hopefully this coming year will see better conditions and more fruiting bodies. If you are sending me records, and I hope you will however insignificant you think they are, please include three pieces of information: (1) the site name with a grid reference if possible; (2) the fungi species name either Latin or English (preferably Latin); (3) the habitat, eg, the tree species, grassy, bare soil, etc, as this information is most important for the records.

My thanks have to go to Ray Halstead, Jan Rousseau, Jackie Freeman and Colin Faulkner and others for their records and support at various forays, also I must not forget Phil Porter and David Knight who have kept me supplied with specimens to identify, not that I always successfully identify them!

SHIELDBUGS

Annette Binding

A new shieldbug was added to the county list in 2007 when Colin Smith swept a single adult bishop's mitre *Aelia acuminata* at Minting Wood at the Lincolnshire Naturalists' Union Meeting on the 13th May. *Aelia acuminata* appears to have been spreading in recent years and can be found by sweeping low vegetation.



Bishops' mitre *Aelia acuminate*
Allan Binding

We found the species in good numbers in Clumber Park, Nottinghamshire in 2007, often on bramble leaves on woodland edges where both adults and nymphs could be seen sunning themselves. The discovery of the bishop's mitre brings the total number of species recorded in Lincolnshire to twenty-one.

Eighteen species of the twenty-one species were recorded in 2007, mainly due to the hard work of Colin Smith. As well as the bishop's mitre, Colin recorded the only *Picromerus bidens* and *Rhacognathus punctatus* in 2007. He found *Picromerus bidens* at Crowle Moor on the 16th August and the *Rhacognathus punctatus* at Linwood Warren on the 12th April.

There were three records of *Podops inuncta*, two from Colin at Sleaford and Donna Nook in March and one from John Lamin who found it at Scottlethorpe Quarry on the 10th June.

John Lamin also sent in the only record of *Legnotus limbosus* in 2007 which he found at Bourne South Fen on the 11th June.

The green shieldbug *Palomena prasina* continues to be the species for which I receive the most records, thirty-nine in 2007, and *Dolycoris baccarum* continues to spread in the county. There were nine records of this species in 2007, three of which were from new locations, Scotton Common, Nettleton Moor and Greetwell Hollow Quarry. It was also good to receive eight records of the parent bug *Elasmucha grisea*, which had appeared to be declining in recent years. The records were from eight different sites and all except one were recorded by Colin Smith.

SPIDERS

Annette Binding

One species of spider, *Cicurina cicur,* was added to the Lincolnshire list in 2007. Although collected by Colin Smith in 2005 the specimen was overlooked and was not identified until April 2007. Colin collected the spider at Wickenby Wood on the 16th March 2005. It is the only species in the genus *Cicurina* in Europe and looks very like a Clubionid although it differs from those in having a shining glossy carapace, not covered in fine hairs like a Clubionid. *Cicurina cicur* favours dark, damp habitats such as cellars and caves and also occurs under stones and in moss in wet woodlands. The species is rare in Britain and most records are from southern and eastern England although there are a few records from Yorkshire and Scotland.

As well as *Cicurina cicur*, Colin Smith found a number of spiders with very few other records. They included three species with only one previous record. These were a male *Araneus alsine* which was attracted to a mercury vapour lamp at Willingham Forest on the 13th September 2007. Rare in Britain, the species was previously recorded by L. A. Carr at Stainton Wood near Langworth in June 1919. It likes damp clearings and ditches in woodland.

The second species with only one previous record was a female *Philodromus histrio* which Colin collected at Crowle Moor NNR on 28th May 2007. The spider, which is distinctively marked, is usually found on heather and the previous Lincolnshire record was from Kirkby Moor in 1995.

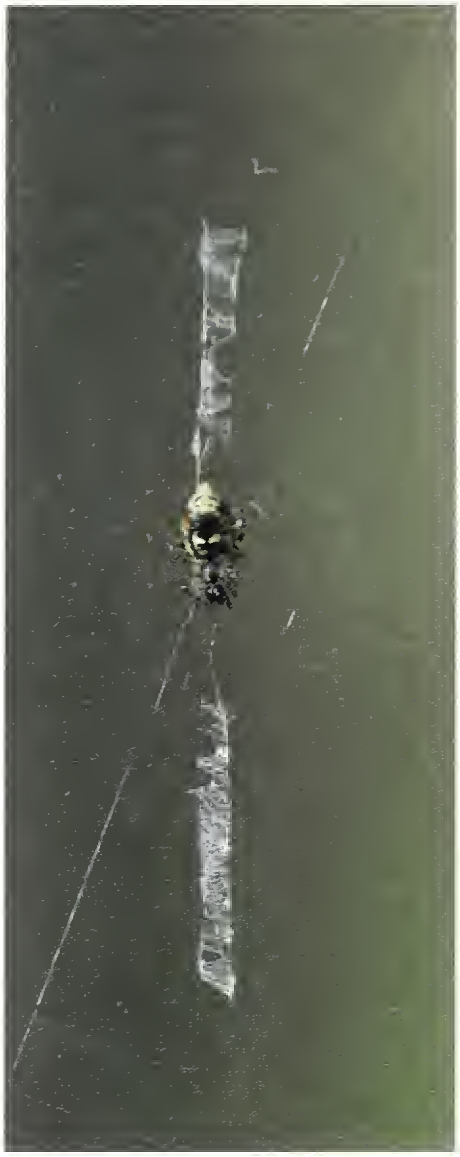
The third species found by Colin and having only one previous county record was *Allomengea scopigera*. Colin collected two females and one male at Saltfleetby-Theddlethorpe – Rimac on 10th August 2007. The species which is widespread in northern and western Britain also has some coastal records from south-east England. It likes wet habitats including salt-marshes. The only previous Lincolnshire record was from Alkborough, one male found on the sea-shore by George Whatmough in September 1976.

Among the other spiders found by Colin Smith in 2007 was the Linyphid, *Walckenaeria cuspidata*. The female spider was collected at Bishopbridge on the 8th March. It was the fifth county record and the first since 1970.

Colin also found two male *Philodromus collinus* (Notable b) at Scotton Common LWT Reserve on 27 June, the 5th county record for this species which is uncommon in Britain.

Both Colin Smith and Stephen Sowden recorded the Linyphid, *Floronia bucculenta*, the single member of the genus *Floronia* in northern Europe. Colin found one female at Willingham Forest on the 31st August and Stephen Sowden found one specimen, also a female, at Graizelound on 3rd October. They were the fifth and sixth county records of this species.

Due in part to family illness and bad weather my own contribution to spider recording in 2007 was mainly in identification of specimens caught by other people. We did, however, make two very early visits to Hardy Gang Wood in March and noticed the large number of *Cyclosa conica* webs. This distinctively shaped spider makes a web which often has an irregular band of thicker silk across it, known as a stabilimentum. Most of the webs we found on our visits had a stabilimentum. Also at Hardy Gang Wood, we found good numbers of the Linyphid spider, *Drapetisca socialis*. It is the single European species of the genus *Drapetisca* and spins its web on the trunks of trees. The web is extremely fine making it very difficult to see. Although not uncommon in the county, Hardy Gang Wood was a new site for this species.



Cyclosa conica with stabilimentum   Allan Binding

Finally a large black spider found at Skellingthorpe by Glenda Peacock was sent to me in October via Phil Porter. It was thought to be a black widow. It was however a large female *Steatoda grossa,* the third county record of this spider. The species, which is related to the true black widow, is much commoner in the south of the country. It is, as this one was, usually found in houses and is harmless to man.

I am grateful to all those who have sent records and specimens to me in 2007.

BOTANY 2006

Irene Weston and Paul Kirby

Eight field meetings were held in 2006:

April 2nd	Cloot Drove, Near Spalding, TF21
May 21st	Morkery Wood, SK91
June 4th	Corus Steelworks, Scunthorpe, SE90/91
June 11th	River Welland, Stamford, TF00
July 23rd	Legbourne Wood, TF38
August 20th	Trent Port, Marton, SK88
September 17th	Rimac, TF49
October 22nd	Haugham Wood, TF38. Fungus Foray

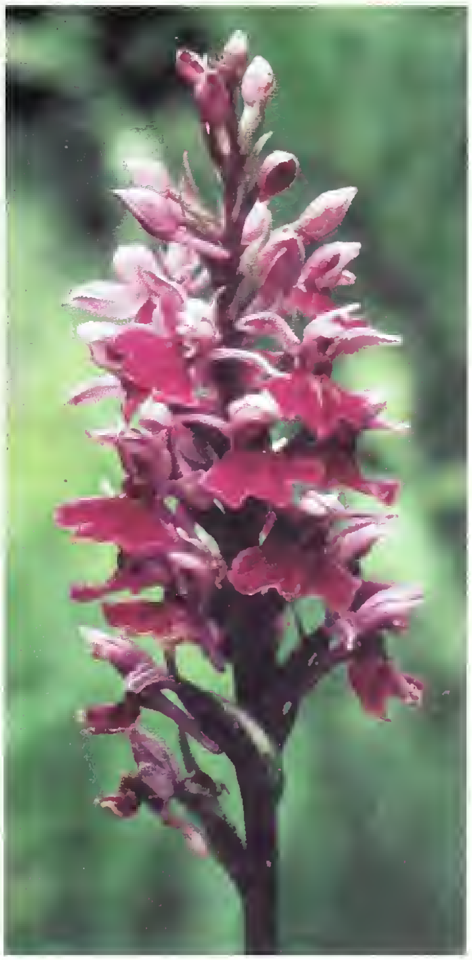
Comments on notable records from the field meetings are included in the general text.

The green-flowered helleborine *Epipactis phyllanthes* found at Whisby Nature Park in 2005 by Jan Rousseau was investigated further (IW, PK, MDP & GH). Two pickled flowers were sent to Professor John Richards for determination to variety. One flower was typical var. *degenera* and the other typical var. *phyllanthes*. As both flowers were from the same plant, this posed an interesting conundrum for recording - should one plant be recorded as two varieties? Apparently variation of flower type on one plant is found in *Epipactis phyllanthes* and so the plant was recorded as *E. phyllanthes*, varying from v. *degenera* to v. *phyllanthes*.

Epipactis dunensis Paul Kirby

Broad-leaved helleborine *Epipactis helleborine*. A population known in the same Whisby locality as the *E. phyllanthes*, was also carefully examined. The plants showed considerable variation. One plant, 125cms tall, was well outside the height range [to 80 (100) cms] given in *The New Flora of the British Isles* (Stace 1997). A truly gigantic specimen.

Dune helleborine *Epipactis dunensis*. This rare helleborine was recorded by V. Wilkin at Messingham Sand Quarry NR in July 2006 (confirmed by Professor John Richards) – this is the only extant site for the County. In the past it was known from Crowle Moors NR (IW & EJG 1980 – 1990) and Osgodby Corner (IW 1978 – 82). There has been considerable debate about the nomenclature of this species and the earlier records are mapped under *E. leptochila* in *Atlas 2000*.



Dactylorhiza fuchsii ssp. *fuchsii* var. *rhodochila*
Both photos Mr and Mrs G. S. Phillips

Dactylorhiza fuchsii ssp. *fuchsii* var. *rhodochila*. Two plants of this striking orchid were recorded from the south bank of the New Torne River near Little Hirst SE70 on June 21, 2006 (IW, PK & VW). This variety was first recorded in Britain (IW & EJG) at this site in 1975 and described at the Annual BSBI Exhibition Meeting. Four plants were found originally and persisted until the 1980's. In 2006 one plant was found at the original site in SE7709 and another further to the east, growing among many typical *D. fuchsii*, in SE7809. When found in 1975 the orchid, which is exceptionally highly pigmented with reddish-purple flowers and bronze leaves, had no varietal status. It was subsequently given the var. epithet rhodochila by D. M. Turner-Ettlinger. It was also known in the early 1980s from Derbyshire and has since been recorded from Sussex, Surrey, Nottinghamshire, Durham and Fife and there is a herbarium specimen in Sussex dated 1870 (Lang 2004). In 2005 it was also found in mid-west Yorkshire (Abbott 2005).

Bee orchid *Ophrys apifera*. Large numbers were found at Whisby Nature Park (PP) in 2006 - 965 vegetative rosettes and many flower spikes - 27 Plover Beach, 76 Sandhills, 82 Redlands and 37 Thorpe Peninsula. Bee orchid was also recorded by Ron Saunders on his garden lawn in Scothern. Three spikes appeared in 2006 where there had only been one in 2005.

P. Porter sent in a detailed list from Whisby Nature Park including common broomrape *Orobanche minor*, pyramidal orchid *Anacamptis pyramidalis*, zig-zag clover *Trifolium medium*, wormwood *Artemisia absinthium* and lesser water-plantain *Baldellia ranunculoides*. Both common spotted *Dactyloriza fuchsii* and southern marsh orchids *D. praetermissa* are also flourishing on the reserve.

Needle spike-rush *Eleocharis acicularis* and fine-leaved water dropwort *Oenanthe aquatica* were recorded by Tim Smith at the Cloot Drove LNU Meeting.

Grass vetchling *Lathyrus nissolia*
Kay Heath

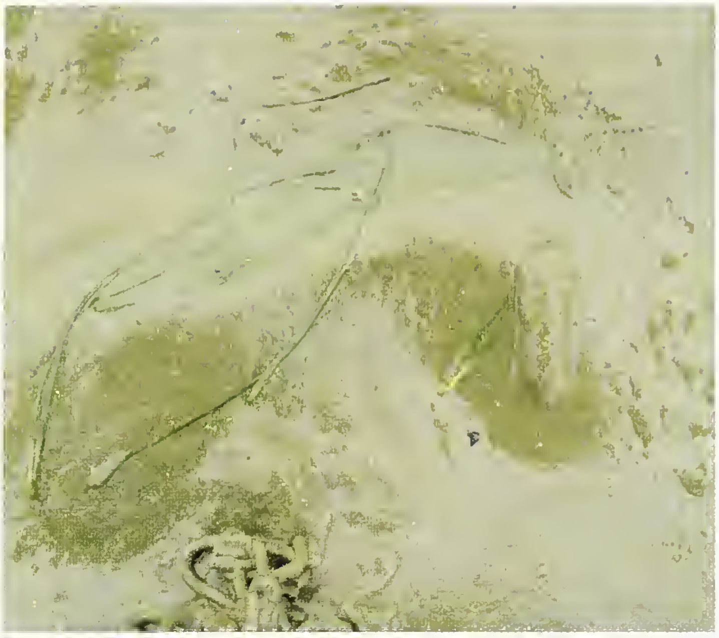
Grass vetchling *Lathyrus nissolia.* Kay Heath recorded over 100 plants from the Deeping Lakes NR, TF1707.

Corn marigold *Chrysanthemum segetum*. In July P. Cole found this increasingly scarce arable weed in profusion in a sugar beet field at Messingham SE8903.

Bog pimpernel *Anagallis tenella*. A very dense population was recorded in the marsh at Messingham Sand Quarry NR SE91 by P. Cole in July.

Black poplar *Populus nigra* subsp. *betufolia*
Mr J.G. Porter

Native black poplar *Populus nigra* subsp. *betulifolia*. G. Lloyd & A. Henderson. Island Farm, Garthorpe, SE82. Visited by J. G. Porter in December 2005 and by IW, PK, VW & Z. Harris in 2006. Two large trees, some regenerating stumps and plantings.



Dwarf eel-grass *Zostera noltei*
Paul Kirby

Dwarf eel-grass *Zostera noltei.* In November 2005 Graham Weaver found a small patch of eel-grass *Zostera* sp. near Horseshoe Point, TA3802. The site was re-visited in 2006 and a fruiting specimen confirmed that it was dwarf eel-grass *Zostera noltei.* The colony consisted of two small sparse patches growing on firm sand mixed with a small amount of mud between half tide and low tide. There are very few records for this plant in Lincolnshire.

Ribbon-leaved water-plantain *Alisma gramineum.* In July-August 2006 Dr Margaret Palmer (English Nature contract) recorded 50 plants – 36 flowering and all submerged - in The Blue Gowt Drain in TF22. The plant was known from this drain in the past but had not been seen since 1992. In the early 1990s seeds were collected, germinated at Monks Wood and then transplanted into Baston Fen NR, but none survived. It is a Red Data Book plant which was first recorded in Lincolnshire in 1955 at an LNU Meeting at Surfleet. It was abundant in 1956 at various sites nearby but then decreased gradually due to dredging. The 2006 record is the only extant site in the county.

Pillwort *Pilularia globulifera*. Pit in Toadwater, December 15, 2006. PP, IW & PK. In the past there have been prolific populations of pillwort in Lincolnshire in Messingham Sand Quarry NR, Sandtoft Drain, Swanholme Lakes and the Toadwater complex. During recent years it appeared to diminish throughout the county and a special effort was made to re-find it in 2006. The Toadwater site was the only one where it was found and here the pillwort was becoming buried under a dense mat of *Crassula helmsii.* This is possibly the fate of the plant at the other Lincoln sites.

Fragrant agrimony *Agrimonia procera*. J. Fraser. Welton High Wood, TF46 in 2005. The Welton Woods were revisited in August 2006 (JF & PK). Agrimony *A. eupatoria* was found in Welton Low Wood and two colonies of *Agrimonia procera* (confirmed Tim Rich) found on rides in Welton High Wood. The only previous Lincolnshire record for this plant was made by Miss Catherine Stow at Woodhall Spa in 1900. Her specimen is in the County Herbarium at Lincoln. There are many records for agrimony in the Welton Woods and it may well be that *A. procera* has been over-looked.

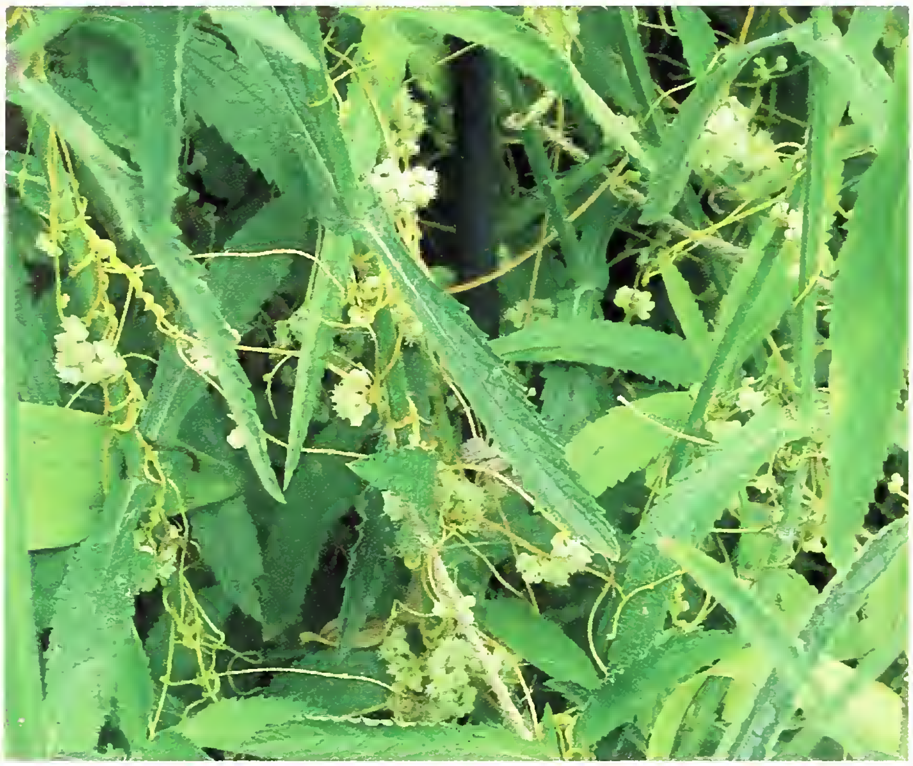
Corn buttercup *Ranunculus arvensis*. Grainthorpe, Biergate, arable. TF3696. Mrs Christine Adlard in July. 30-40 plants at same location as 2005.

Lea Marshes SSSI, J. Fraser & PK, June 26: Wood club-rush *Scirpus sylvaticus,* one patch in a ditch margin SK8186 - narrow-leaved water dropwort *Oenanthe silaifolia* re-found in both fields but only as scattered plants.

Tasteless water-pepper *Persicaria mitis*. Marton, bank of River Trent SK8380. PK & BH. A single plant at the LNU Meeting, August 20. BH found an additional 44 plants on September 27, further south along the Trent bank in the same monad. Two other Trent 'specials' seen at this LNU Meeting were hemlock water dropwort *Oenanthe crocata* and garden angelica *Angelica archangelica*.

Bearded fescue *Vulpia ciliata subsp. ambigua* . Scunthorpe Steelworks, SE9309 & SE9113. LNU Meeting June 4. Other notable species recorded at this meeting included purple milk vetch *Astragalus danicus* and smooth cat's-ear *Hypochaeris glabra*.

Guernsey fleabane *Conyza sumatrensis*. Gainsborough Steel Stockyards, SE8189. November 6. Tim Smith. A new county record.



Yellow dodder
Cuscuta campestris
Paul Kirby

Yellow dodder *Cuscuta campestris*. Recorded by Peter Haywood from a garden at North Hykeham SK96 growing in profusion in a flower bed among verbena. A new county record.

California brome *Ceratochloa carinata*. Roxby Causeway, field margin, SE91. PK & VW. Confirmed Laurie Spalton, BSBI. 20 plants in edge of wheat field, July 7. A new county record.

Niger *Guizotia abyssinica*. P. Cole in a garden in Scunthorpe, Kingsway SE8809. Determined by Brian Wurzell, BSBI alien referee. This birdseed alien was also recorded by Ena Johnson from a garden in Mulberry Road, Claxby TF1194. The only previous records are from the Cleethorpes and Humberston dumps around 1960. The seed is now included in garden bird feed and so more records are likely.

Apple of Peru *Nicandra physalodes* and thorn-apple *Datura stramonium*. Ken Skelton in his garden at Washingborough, TF07, Vc 53. *N. physalodes* was also found at Dalby Grange Farm by Mrs Betty Middleton, October 12.

Many thanks to all who sent in records in 2006 and a special thank you to Terry Cook for organising and leading the Corus Meeting.

References

Abbott, P. P., 2005. *Plant Atlas of Mid-West Yorkshire.* Yorkshire Naturalists' Union.
Lang, D.C., 2004. *Britain's Orchids.* Old Basing (Hampshire): WILDGuides
Stace, C. A. 1997. *New Flora of the British Isles,* edn. 2. Cambridge: Cambridge University Press.

Key to initials in text

IW, Rene Weston – PK, Paul Kirby - MDP, Malcolm Pool – PP, Phil Porter – VW, Vi Wilkin – EJG, Joan Gibbons – BH, Brian Hedley – GH, Grahame Hopwood – ZH, Zella Harris

WEATHER

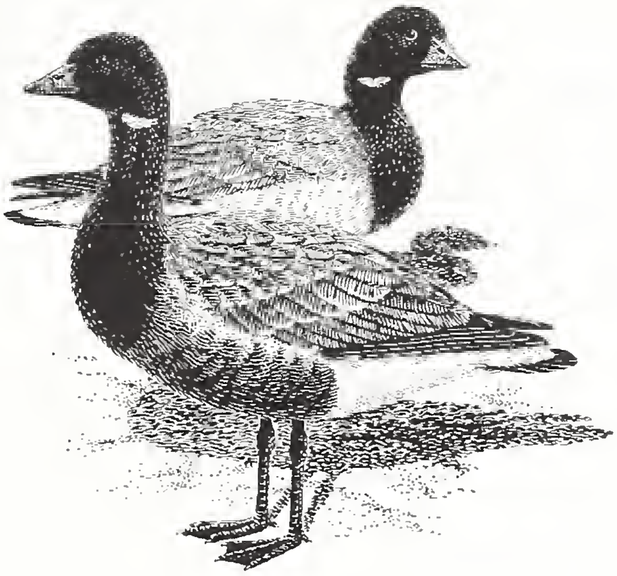
Nick Tribe

2007 will live long in the memory for the amount of rain that fell between May and July; 'the year without a summer'. June was especially wet with four times the usual rainfall for the month with the north of the historic county receiving nearer 400mm of rain. Louth flooded twice in June and July and Horncastle flooded in June.

Across the UK, it was the second warmest year recorded. Nine of the ten warmest years on record in the UK have been recorded since 1990. All six top warmest years have occurred since 2002.

Rainfall at Whisby Nature Park (Lincoln) compared with long-term mean (1971-2000) at RAF Waddington. Waddington data supplied by the Meteorological Office.

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Total
2007	71.9	63.2	31.1	5.6	97.4	219.3	109	34.3	15.6	41.8	44.1	46.2	779.5
1971-2000 mean	52.4	37.8	47.4	44.4	47.7	55.3	44.5	57.6	51.1	53.4	52.1	55.1	598.8



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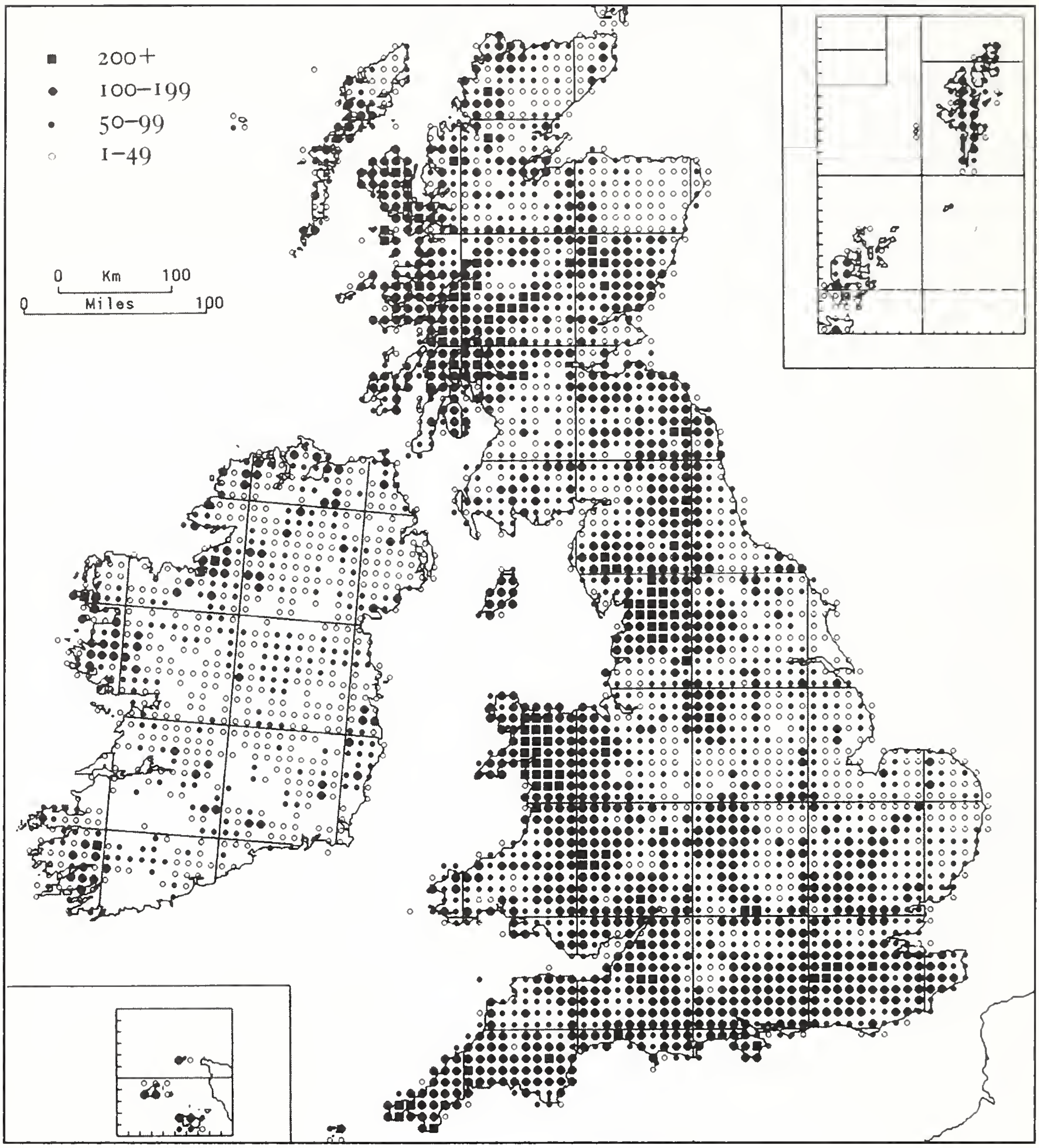

Distribution map for mosses except *Sphagnum* spp. Total number of species per 10km square. From Hill et al (1991, 1992, 1994). (Reproduced with the kind permission of Harley Books).

TRANSACTIONS OF THE LINCOLNSHIRE NATURALISTS' UNION

Officers of the Union in 2007 (Year of election to the Executive Committee)

President Dr Michael Archer (2006)
President elect Colin Smith (2001)
General Secretary Margaret Haggerty (2006)
Treasurer Ian MacAlpine-Leny (2001)
Membership Secretary via LWT
Publicity Secretary Vacant
Programme Secretary Ashley Butterfield (2006)
Sales Secretary Colin Smith (2001)
Transactions Editor Nick Tribe (2004)
Auditor Emma Murray (Nicholsons)

Executive Committee Chris Manning (2001), Ian Cappitt (2005), Richard Chadd (2002), Brian Hedley (2007), Christine Rieser (2005)

External representatives Ken Rowland (Swanholme Advisory Group), Richard Chadd (Lincolnshire Environmental Records Centre), Chris Manning (Wildlife Sites Review Group and Lincolnshire Biodiversity Action Plan). Ian MacAlpine-Leny (Lincolnshire Bird Club).

Section Recorders

Ants, wasps & bees Dr Michael Archer	**Bats** Mrs Annette Faulkner
Beetles Dr Roger Key	**Bryophytes/lichens** Prof. Mark Seaward
Butterflies Mr Allan Binding	**Dragonflies** Mr Richard Chadd
Fish Mr Nick Bromidge & Mr Ian MacAlpine-Leny	**Flies** Mr Andrew Godfrey & Mrs Jillian Mears
Freshwater invertebrates Richard Chadd & Ms Alice Hiley	**Fungi** Mr Ken Rowland
Grasshoppers, etc. Mr Brian Redman	**Geology** Mr David Robinson
Higher plants Mrs Mr Paul Kirby	**Isopods & myriapods** Mr Neil Pike
Macro moths Mr Colin Smith	**Mammals** Mr Chris Manning
Micro moths Mr Colin Smith	**Molluscs** Mr John Redshaw
Plant Galls Mr Graeme Clayton	**Sawflies** Dr David Shepphard
Spiders Mrs Annette Binding	**Shield bugs** Mrs Annette Binding

SECRETARY'S REPORT

Margaret Haggerty

2007 has been a successful year for the LNU seeing increased membership at a time when other natural history societies are witnessing downturns in numbers. The Executive Committee met four times over the year and there were six field meetings held around the county.

September saw the sad death of Zella Harris, an active botanist whose records are now an important part of the Botany Project database.

The Collections Working Party has had a busy year working in our room at the Riseholme Campus of the University of Lincoln. There have been issues to overcome relating to the preservation of specimens but the collation of published material has been very successful, due in great part to the donations of runs of Transactions.

The new Lincolnshire Biodiversity Partnership was launched in October building on the strengths of the Biodiversity Action Plan Partnership. The Partnership brings together the Biodiversity Action Plan, Environmental Records Centre and Local Wildlife Sites system and includes a wide range of partners including statutory bodies, local authorities and local groups. The LNU as been involved in the establishment of this Partnership from the start and has an automatic place on the Steering Group.

The LNU also continues to have active representation on other bodies including the Bird Club Committee, Lincolnshire Wildlife Trust Biodiversity Team and the Local Wildlife Sites Panel.

The LNU has had a stand at the Lincolnshire Show within the Lincolnshire Wildlife Trust marquee for the last two years. This has been successful in raising the profile of the LNU, book sales and eliciting interest from visitors, especially when live specimens were available. The theme for this year will be wetlands.

BioBlitz has become an annual event at the LWT headquarters at Banovallum House, Horncastle. This year (the third), the event will be held jointly between LWT, LBP and LNU. The aim of the event is to record as many different species as possible in a 24 hour period and to introduce people to the joys of biological recording with the essential support of specialists. Last year we recorded 326 species. Can we do even better?

MEETINGS IN 2007

Saturday, 20th January Illustrated Talk by Dr Arnie Cooke - Long term surveillance and conservation of amphibian populations.

Saturday 17th February Recorders' Meeting

Saturday 10th March AGM and Presidential Address by Christine Rieser - Looking for bryophytes in Lincolnshire

691st meeting Sunday 13th May	Minting Wood
692nd meeting Sunday 10th June	River Trent near Dunham Bridge
693rd meeting Sunday 8th July	Swanholme Lakes SSSI
694th meeting Sunday 19th August	RAF Wainfleet
695th meeting Sunday 9th September	Hardy Gang Wood
696th meeting Sunday 21st October	Grimsthorpe Castle

Saturday 8th December Anne Goodall – The landscape and historical ecology of the Lincolnshire Limewoods

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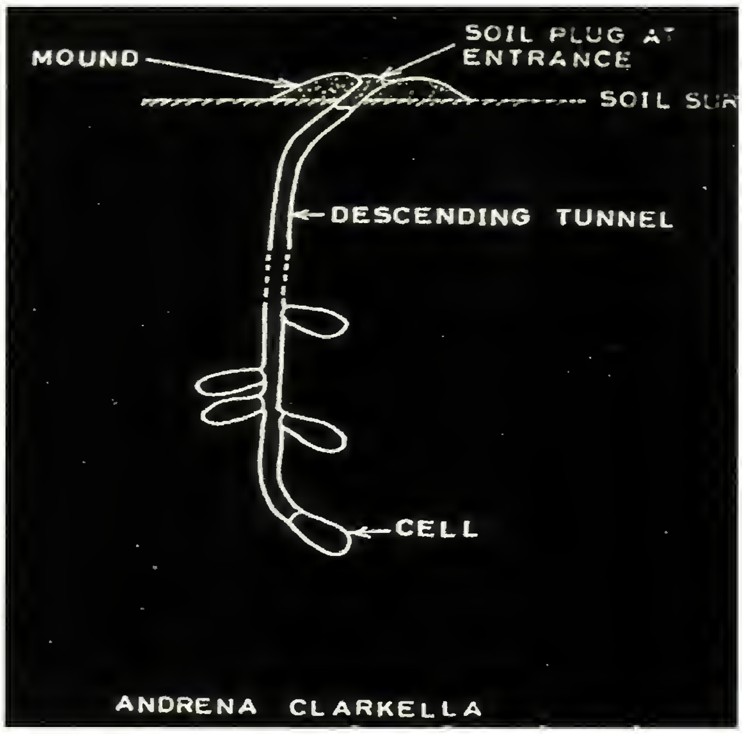
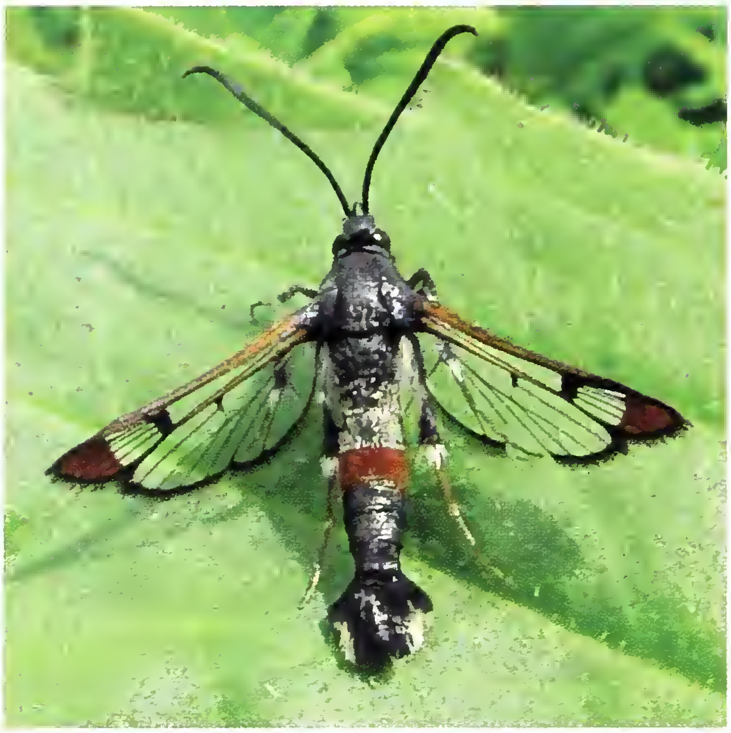
ADDITIONAL PHOTOGRAPHS

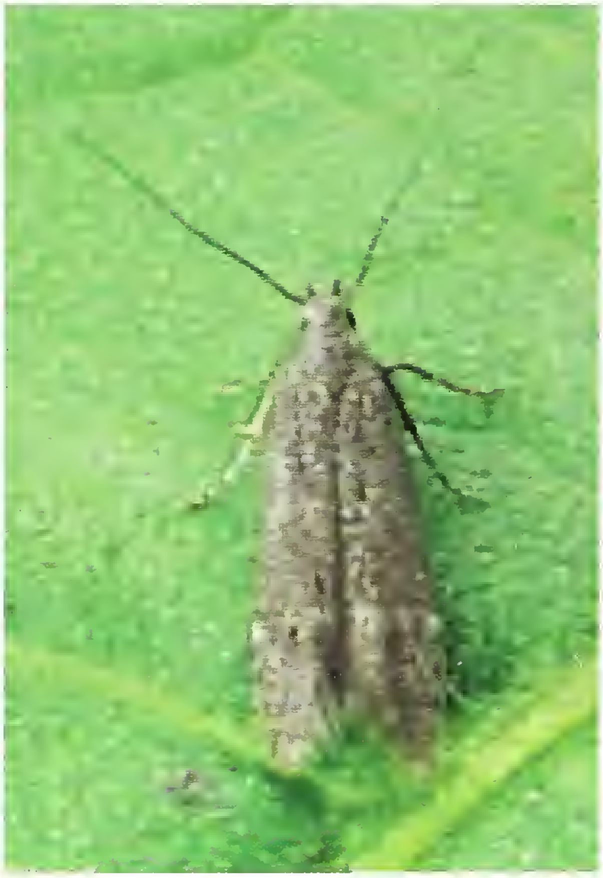


Andrena clarkella burrow section (Page 1)

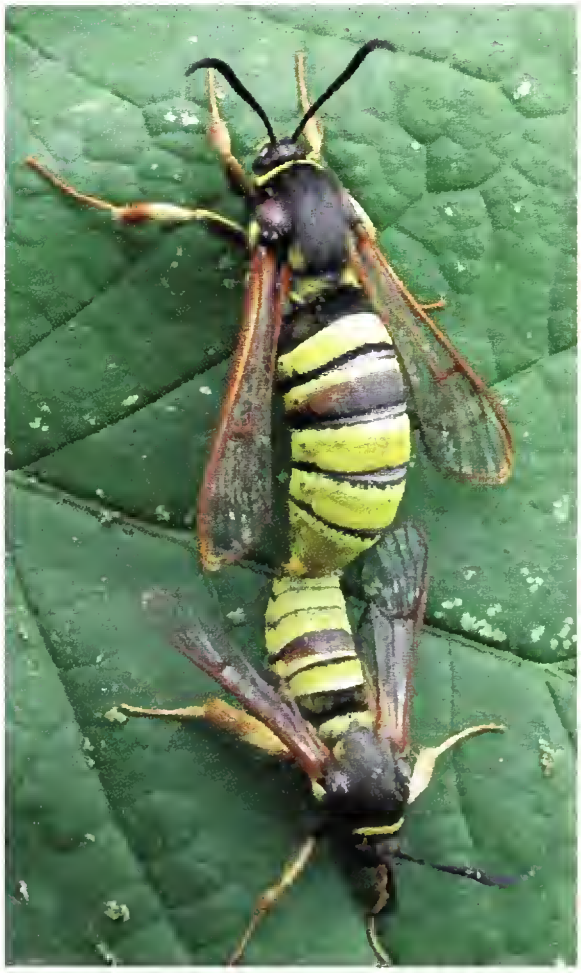
Andrena clarkella pollen ball (Page 1)
Michael Archer



Red-tipped clearwing (Page 43) Roger Labbett



Monochroa hornigi (Page 45)
Roger Labbett



Lunar hornet moths (Page 43) Martin Gray

Contributing to *The Lincolnshire Naturalist*

We are constantly on the lookout for full length articles or short notes, even a few lines which can be useful space fillers, on any aspect of our natural history, current or historic. Consider a note in *The Lincolnshire Naturalist* for any new or significant observations. Articles should be typed. It would help the editor tremendously if they could either be e-mailed or sent on CD or floppy disk with accompanying paper copy, in Word© or Word Perfect© format. Drawings, colour or black & white photographs, colour transparencies or negatives (please include a print) can be included. If you submit your own photographs, take them or scan them at a resolution of at least 200 dots per inch and at a size equal to or larger than the size they will be printed at (approximately 11.5x7.5cm). Colour illustration may be rendered to black and white. Please give a caption. Illustrations will be returned and edited text resubmitted to the author for approval and proof-reading before publication.
Convention adopted for names - Latin names should be *italicised*, **not** (bracketed) nor underlined and should follow the English name (where applicable) with no separating comma. English names should start with lower case letters unless incorporating other names warranting capitalisation (eg Brandt's bat).

References to journals and books should please be as below. Please note and use the capitalization and italic convention.
WOODRUFFE-PEACOCK, Rev E.A., 1900. The Lincolnshire Naturalists at Freiston. *The Naturalist*, **25**: 141-144.
DUDDINGTON, J. & JOHNSON, R. 1983. *The Butterflies and Larger Moths of Lincolnshire and South Humberside*. Lincolnshire Naturalists' Union. Lincoln. 299pp.

The final copy date is **31st March** of the year in which the Transactions are to be issued. Please contact the editor directly if there is difficulty in meeting this deadline. If in any doubt as to whether your observation merits a note or an article, or you have any other queries please do get in touch with the editor c/o Lincolnshire Naturalists' Union, Lincolnshire Wildlife Trust, Banovallum House, Horncastle, LN9 5HF to whom texts should be sent. A guidance note is available and is sent out to recorders. Otherwise, please attempt to imitate the format in this issue of the Lincolnshire Naturalist.

EDITORIAL

Nick Tribe

Once again, I hope that this edition of *Transactions* has at least one article (and hopefully more) of interest to every reader. The usual big ‘thank you’ is extended to all contributors; your efforts in producing the articles and photographs for this year’s edition are appreciated by all members of the LNU.

Michael Archer’s Presidential Address covers sites outside Lincolnshire which very strictly speaking is outside the remit of this publication. I am sure that you will agree that the qualities of this fascinating and insightful article more than outweigh this slight diversion from our usual fare.

I have made the decision to alter the appearance of *Transactions* by dispensing with the colour plates section and spreading the illustrations throughout the publication. Hopefully this will bring the publication up to the standard that readers expect and that the cost will prove to be acceptable to the Union.

THE LINCOLNSHIRE NATURALIST

including
Transactions of the Lincolnshire Naturalists' Union
for 2007
Volume 27, Part 1, 2008

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